

Forty-Fifth Annual Report
OF THE
BOARD OF TRUSTEES
OF
THE CLEMSON
AGRICULTURAL
COLLEGE
TO THE
General Assembly of South Carolina
1934

THE CLEMSON AGRICULTURAL COLLEGE
RECORD

Published quarterly by the Clemson Agricultural College, Clemson College, S. C. Entered as second class matter April 25, 1905, at the Post Office at Clemson College, South Carolina, under the Act of July 16, 1894, now superseded by the Act of August 24, 1912.

SC

LD1041

C6

1934-39

TABLE OF CONTENTS

	Page
Letter of Transmittal -----	3
Report of President -----	5
Enrollment by Counties and States for 1933-1934 -----	11
Scholarship Students -----	12
Report of Treasurer -----	13
Report of Director of Extension -----	19
Report of Board of Visitors -----	33
Report of Secretary of Fertilizer Board -----	36
Report of State Veterinarian -----	37
Report of Chief Chemist -----	40
Report of State Crop Pest Commission -----	43
Report of Director of Experiment Station -----	54

LETTER OF TRANSMITTAL

To the Members of the General Assembly
Columbia, South Carolina

Gentlemen:

The Trustees of The Clemson Agricultural College beg to transmit herewith, for your information and thoughtful consideration, the report of President E. W. Sikes, concerning the affairs of the College for the fiscal year July 1, 1933 to June 30, 1934. The report is full and complete, and reviews in detail all college activities.

We wish to take this opportunity to say to the members of the General Assembly that we feel that we are most fortunate in having the faithful and efficient services of President Sikes. His qualities of head and heart endear him to students and faculty. He is also an asset to the college wherever he is known throughout the state.

The members of the faculty and officers of the college also deserve great praise for their cooperation and faithful service.

Very truly yours,
JOHN E. WANNAMAKER,
President Board of Trustees.

July 1, 1934.

90393

CLEMSON AGRICULTURAL COLLEGE

Clemson College (The Agricultural and Mechanical College of South Carolina) renders two major lines of service.

1 Collegiate Instruction

Courses leading to the B.S. degree in the following:

Agriculture
Architecture
General Science
Chemistry
Engineering
Agricultural Education
Industrial Education
Textiles

Summer School in Vocational Subjects

2 Public Service

Agricultural Research—Clemson College, Charleston, Florence, Pontiac and Summerville Experiment Stations.

Cooperative experiments with farmers.

Textile Research—At Clemson College, manufacturing tests—grades, staples, varieties—in cooperation with U. S. D. A.

Textile Testing—At Clemson College, yarn testing service for cotton mills of South Carolina.

Agricultural Extension—County agents serve in counties. Specialists serve any point in the State on request.

Livestock Sanitary Work—Veterinarians are located in various parts of the State for control and eradication of infectious and contagious diseases.

Fertilizer Inspection—Inspects the fertilizer bought and sold in the State.

State Crop Pest Service—Study and control of contagious plant diseases and insect pests.

Report of the President of the College

Clemson College, South Carolina
December 1, 1934

From E. W. Sikes
President, The Clemson Agricultural College

To The Honorable John E. Wannamaker
President, The Board of Trustees

Dear Sir:

I have the honor to present to you the 45th report of the President of Clemson College, this report covering the 41st session of the institution.

The distinctive purpose of an agricultural and engineering college is to raise up, qualify, and send forth men to meet the economic and social needs of the state. The men who created these colleges and who have appropriated funds for their maintenance have done so for the purpose of technical and vocational training. However much such an institution may emphasize the ideals of personal culture, this emphasis must not obscure its primary purpose. There are two purposes in education—one is the development of personal character for personal satisfaction and the other is the development of efficiency of the service to be rendered to society. The chief service that man renders to society is through his vocation. There is more humanitarianism in the study of the social and economic needs of society, and the ways and means of meeting them, than in the study of the "humanities". Culture may be so academic that it is simply personal and reflective. The culture of vocational and technical training is practical and active. While man does not live by bread alone, he can not live without it. Public education is not justified simply because it helps the individual advance his economic status; its strongest justification is the advancement of society

as a whole. Ignorance is a hinderance, intelligence a help; inefficiency is a handicap, efficiency an asset. Inability to make a living hinders the making of a life. To carry out these purposes the Clemson College faculty has committees which are continually studying the social and economic needs of South Carolina and modifying the course of study so as to meet these needs.

The method of accomplishing the primary purpose of the college is the setting up of courses that have that end in view. The School of General Science is the service department which prepares men to enter the technical schools. All students belong to this school. Pure science, history, mathematics, English, and other subjects are necessary tools for the mastery of the vocational and professional subjects. The various phases of agriculture, engineering, textiles, chemistry, and vocational education are taught. The method not only includes theory but also practice. Laboratories, fields, farms, barns, orchards, shops, and plants are all used. Uniforms are prescribed but also overalls are worn in shops and fields.

These methods have been followed at Clemson for forty years. That they have accomplished the purpose is manifested by the occupation of its former students. Among that number are successful farmers in every county in the state, engineers in every section, chemists in every industry, textile men in the cotton mills, and vocational teachers in the schools.

RESEARCH DIVISION

The purpose of agricultural research is to find out new and profitable ways of improving farming. Conditions continually change; soils become depleted, destructive insects appear, and a multitude of other problems unheard of before arise to worry and thwart the farmer. Hundreds of letters come to the office yearly seeking advice and help. Many of these are so new that no scientist has heard of them before. He then must go to work in his laboratory and plots and chase the disease to its hidden lair. Research does for all farmers what would be too expensive and difficult for them to do individually.

The method of the research department is to establish experiment stations. There are five of these stations located in different parts of South Carolina. In cooperation with the United States Department of Agriculture scientists are employed at the stations, various projects are set up, tests are made, records are kept, conclusions are reached, and these are placed in the hands of the county agents and agricultural teachers both in the public schools and the college. These experiment stations work quietly and patiently exploding errors new and old, and discovering the truth so essential to success. The experiment stations are the miners and sappers of the agricultural army.

EXTENSION DIVISION

The purpose of the extension division is to carry to the farmers in their fields the latest and best discoveries and methods. The popularization of scientific knowledge is essential to agricultural progress. Concealed in technical bulletins or locked up in laboratories it would be useless. Such knowledge must needs be expressed in popular language and easily and sympathetically presented.

The method of the extension division is to have in each county a trained man as county agent and a trained woman as a home agent; also to have specialists in different subjects to assist them. In each county also there are committees of farmers and farm women which cooperate and advise with the agents. The publications of the division are plain and simple in their style. Much printed matter is also carried in the local papers which matter is prepared by the county agents, the specialists, and the publications division. The whole work heads up under a director who resides at the college but who is the representative also of the United States Department of Agriculture which cooperates in all extension work. South Carolina was one of the first states to have agents in every county and to have them supported by state funds. No state surpasses South Carolina in the efficiency of its agricultural leadership and organization in the various counties. This includes boys and girls, men and women.

LIVESTOCK SANITARY DIVISION

The purpose of this department is to eradicate and protect against all contagious, infectious, and communicable diseases among livestock. There was no hope for the livestock industry so long as it was unprotected against epidemics.

The method of this division in cooperation with the United States Department of Agriculture is to locate veterinarians in strategic places in the state and to employ local veterinarians as their assistance is needed. Its first major task was to eliminate the cattle tick from every county in the state and to protect against its reintroduction from infested areas. The second major task is to eradicate cattle tuberculosis from the herds. This task is now in progress. A well equipped laboratory is maintained in Columbia where the staff receives specimens from farmers and others, diagnoses the disease, and prescribes the treatment. Members of the staff will visit any place where cholera or any other contagious disease is suspected and cooperate in preventing the spread.

CROP PEST COMMISSION

The purpose of this department is to fight the pests that prey on various crops and to inspect nurseries, greenhouses, bulb farms, and apiaries. Its purpose also is to protect the state against importation of diseased nursery stocks, infected cotton seed, and other such things, and also to issue certificates to growers in this state so that they may market their plants and seeds in other states. This much of the work is regulatory. This commission passes regulations bearing upon shipments. It also cooperates with the federal government in fighting such pests as the pink boll worm, the Japanese beetle, and the European corn borer.

In order to accomplish this the agricultural committee of the board of trustees is made the State Crop Pest Commission; the professor of entomology is the state entomologist, and the professor of plant pathology is the state pathologist. Since their time is also taken up in teaching it is necessary to employ an assistant who does much of the inspection in different parts of the state.

FERTILIZER INSPECTION AND ANALYSIS

The purpose of this department is to analyze the fertilizers that are sold in South Carolina and to see that they contain the proper proportion of ingredients specified and guaranteed. South Carolina uses a large amount of fertilizers. The analysis protects the farmer and the manufacturer—the farmer against fraud and the manufacturer against unfair competition. Chemists are employed under the Director of Research to analyze samples which come to them without name but with only a number.

The samples are received by the Secretary of the Board of Fertilizer Control which board consists of four members of the board of trustees. The Secretary numbers each sample and sends it to the chemists in the fertilizer laboratory.

There are three ways by which samples may be drawn:

1. By an inspector appointed by the Board of Fertilizer Control.
2. By a representative of the manufacturer and a representative of the buyer, and a third person selected by the two.
3. By county agents who are trained and authorized to draw samples.

MISCELLANEOUS

During the summer school short courses are given in poultry, welding, textiles, and shop. This past summer we held a Farmers' Week which was a great success. Courses were offered in the various subjects of interest to farmers and outstanding speakers were brought here to deliver lectures to the farmers. It is hoped that a similar week may be established for industrial workers where special emphasis will be given to the social problems of industrial centers.

The Opportunity School meets here each summer and the college gladly offers its facilities to this group of South Carolina citizens.

PRESENT SESSION

The session of 1934-1935 began on September 5. To date the total enrollment is 1234 and of this number 513 are new students. This year 42 students entered Clemson from

liberal arts colleges where they had taken their general training. They came to Clemson to secure the technical training they wished. Since these men entered the upper classes they could be well accommodated.

The increased enrollment has necessitated the crowding of barracks, class rooms, and laboratories, especially in the first year sections. The increasing demand for social and economic subjects has necessitated the rearrangement of certain classes. Numbers of students have called for Forestry. This course has been cared for.

The Agricultural Adjustment Act has made demands on the College for the use of its staff. Numbers of the Public Service men have been loaned to the Federal Government for varying lengths of time. The Extension and Research forces have cooperated in the programs. This work is in line with the work of the Agricultural and Mechanical Colleges and such colleges are expected by the Federal Government to contribute to and strengthen its personnel.

The passing of Dr. W. W. Long is a distinct loss to the State of South Carolina and to Clemson College. For a generation he was the Director of the Extension Department and the trusted leader of South Carolina farmers. His wisdom, foresight, and tireless activity won for him a high place in the esteem of South Carolinians and in the United States Department of Agriculture.

Respectfully submitted,
E. W. SIKES, President.

ENROLLMENT BY COUNTIES AND STATES FOR 1933-1934

County	Total	State	Total
Abbeville -----	15	Alabama -----	3
Aiken -----	21	Connecticut -----	2
Allendale -----	13	Florida -----	11
Anderson -----	88	Georgia -----	45
Bamberg -----	3	Illinois -----	5
Barnwell -----	10	Maryland -----	1
Beaufort -----	6	Massachusetts -----	2
Berkeley -----	3	Missouri -----	1
Calhoun -----	4	New Hampshire -----	1
Charleston -----	59	New Jersey -----	2
Cherokee -----	8	New York -----	6
Chester -----	20	North Carolina -----	17
Chesterfield -----	11	Republic of Domingo -----	1
Clarendon -----	10	South Carolina -----	1002
Colleton -----	20	Tennessee -----	6
Darlington -----	31	Virginia -----	2
Dillon -----	9	West Virginia -----	1
Dorchester -----	6		
Edgefield -----	23	Grand Total -----	1108
Fairfield -----	13		
Florence -----	43		
Georgetown -----	6		
Greenville -----	77		
Greenwood -----	27		
Hampton -----	17		
Horry -----	6		
Jasper -----	5		
Kershaw -----	12		
Lancaster -----	10		
Laurens -----	24		
Lee -----	16		
Lexington -----	13		
Marion -----	16		
Marlboro -----	10		
McCormick -----	8		
Newberry -----	17		
Oconee -----	55		
Orangeburg -----	28		
Pickens -----	64		
Richland -----	40		
Saluda -----	9		
Spartanburg -----	52		
Sumter -----	14		
Union -----	11		
Williamsburg -----	8		
York -----	41		
Total for South Carolina -----	1002		

Occupations of Parents

Agriculture -----	346
Clerical -----	26
Domestic and Personal Service -----	5
Manufacturing and Mechanical Industries -----	118
Professional Service -----	112
Public Service -----	91
Trade -----	286
Transportation -----	56
Not Given -----	59
Retired -----	9
	1108

SCHOLARSHIP STUDENTS FOR 1933-1934

All, R. A.-----	Allendale	Knight, C. V.-----	Enoree
Ball, A. K., Jr.-----	Eastover	Lacey, C. E.-----	Ravenel
Barnes, D. A.-----	Camden	Langley, A. A.-----	Plum Branch
Barnett, G. M. Jr.-----	Westminster	Langston, P. Q.-----	Conway
Basha, G.-----	Charleston	Land, J. E.-----	Filbert
Beard, S. O.-----	Langley	Langford, M. H.-----	Blythewood
Bigger, T. C.-----	York	Latham, B. M.-----	York
Blakeley, R. W.-----	Piedmont	Lemmon, F. M.-----	Winnsboro
Brannon, C. C.-----	Inman	Linder, V. F.-----	Mt. Holly
Britt, W. L.-----	McCormick	McConnell, W. B.-----	Belton
Brooks, J. B., Jr.-----	Smoaks	McMaster, E. A.-----	Winnsboro
Brown, J. D., Jr.-----	Hemingway	McCown, J. J.-----	Florence
Brown, W. D.-----	Spartanburg	Mack, J. L.-----	Lone Star
Burton, J. C.-----	Honea Path	Malone, H. B., Jr.-----	Chester
Cassidy, J. F.-----	Winnsboro	Mellette, F. M.-----	Boykin
Clayton, C. N.-----	Liberty	Mikell, J. J.-----	Edisto Island
Cooler, S. A.-----	Ridgeland	Nuessner, K. E.-----	Greenville
Copeland, F. P.-----	Lamar	Nolon, M. P.-----	Blenheim
Cureton, A. C.-----	Liberty Hill	O'Kelly, G. R.-----	Bishopville
Eaddy, H. E.-----	Hemingway	Parks, F. L.-----	Meggett
Ellis, J. R.-----	Richburg	Perry, W. B.-----	Easley
Evans, W. D.-----	Cheraw	Pope, D. T.-----	Edisto Island
Floyd, J. L.-----	Tailors	Powell, J. E.-----	Bennettsville
Funderburk, B. J.-----	Cheraw	Rambo, E. K.-----	Ninety Six
Garber, M. I.-----	Williston	Rampey, C. T.-----	Clinton
Gassaway, H. B.-----	Honea Path	Richardson, Duke, Jr.-----	Marion
Gettys, C. M.-----	Catawba	Richardson, H. B.-----	Summerton
Gibert, J. B.-----	Rodman	Rouse, J. T.-----	Luray
Glymph, E. M.-----	Pomaria	Royals, S. T.-----	Hammon
Gray, F. M.-----	Brunson	Salley, C. M.-----	Salley
Green, F. L.-----	Bishopville	Seabrook, S. G.-----	Johns Island
Grieffs, D. P.-----	Edgefield	Shuler, N. P., Jr.-----	Eutawville
Griggs, F. O.-----	Darlington	Smith, W. G.-----	Mullins
Gurley, O. L.-----	Spartanburg	Snipes, T. F.-----	Greenwood
Hanna, W. J.-----	Blacksburg	Steer, R. L.-----	Clinton
Harmon, G. L.-----	Lexington	Strange, T. S.-----	Union
Harrell, R. W., Jr.-----	Columbia	Stuckey, A. H.-----	Bishopville
Hawkins, B. S.-----	Greenville	Thode, J. R.-----	Columbia
Hiott, W. B.-----	Round	Vaughan, H. B.-----	Charleston
Hollis, C. H.-----	Richburg	Webb, W. W.-----	Anderson
Johnson, M. H.-----	Ward	Woodward, R. S.-----	Williston
Kinard, J. D.-----	Ninety Six	Yarborough, W. B.-----	Bookman

REPORT OF TREASURER

Dr. E. W. Sikes, President
The Clemson Agricultural College
Clemson College, South Carolina

Dear Dr. Sikes:

I have the honor of transmitting herewith my annual report of the financial affairs of the Clemson Agricultural College of South Carolina for the fiscal year July 1, 1933 to June 30, 1934 in accordance with an act of the General Assembly.

Respectfully submitted:

S. W. EVANS,
Secretary-Treasurer.

THE CLEMSON AGRICULTURAL COLLEGE**Collegiate Activities****FISCAL YEAR****JULY 1, 1933 to JUNE 30, 1934****INCOME**

1—State Appropriation -----		\$ 43 257 50
2—Privilege Fertilizer Tax 1932-1933 -----		18 674 23
2—Privilege Fertilizer Tax 1933-1934 -----	\$145 365 78	
Less Cost Inspection and Analysis-----	16 074 48	129 291 30
3—Federal Funds:		
Morrill-Nelson -----	25 000 00	
Landscrip -----	5 754 00	30 754 00
4—Tuition and Fees -----		92 653 24
5—Interest Clemson Bequest -----		3 512 36
6—Miscellaneous Funds—Net -----		6 811 95
Total Income for Collegiate Activities--		<u>\$324 954 58</u>

Collegiate Activities**EXPENDITURES JULY 1, 1933—JUNE 30, 1934****Exhibit A****A—Personal Service:****1. Salaries:**

Morrill-Nelson Funds ---	\$25 000 00	
Landscrip -----	5 754 00	30 754 00
Other Funds -----		159 618 15

190 372 15

2. Wages ----- 33 512 35

3. Special Payments ----- 52 00 \$223 936 50

B—Contractual Service:

1. Freight, Express & Deliveries -----	273 75	
2. Travel -----	2 182 44	
3. Telegraph & Telephone -----	1 403 64	
4. Repairs -----	4 785 86	
5. Printing Catalogs, Bulletins, Etc. ----	1 701 38	
7. Other Contractual Services -----	826 51	11 173 58

C—Supplies:

2. Fuel & Electric Current -----	7 820 24	
3. Feed & Veterinary Supplies -----	2 203 04	
4. Office Supplies -----	5 501 49	
8. Educational Supplies -----	8 582 99	
9. Motor Vehicle Supplies -----	1 630 32	
10. Agricultural Supplies -----	728 32	
12. Other Supplies -----	942 53	27 408 93

D—Fixed Charges & Contributions:

2. Rent -----	28 50	
4. Insurance -----	15 346 79	
6. Aid for Education -----	8 350 00	
10. Other Fixed Charges -----	305 17	24 030 46

F—Materials:

1. Office Equipment -----	40 01	
3. Household Equipment -----	142 50	
4. Motor Vehicle Equipment -----	350 00	
7. Educational Equipment -----	2 126 34	
8. Other Equipment -----	26 17	
Equipment Fund -----	13 000 00	15 685 02

H—Lands & Structures:

2. Non-structural Improvements -----	97 15	97 15
--------------------------------------	-------	-------

Total Collegiate Activities ----- \$302 331 64

**Fertilizer Inspection and Analysis, Poison Analyses,
Analyses of Water, Soils, Manures, Etc.**

A-1 Salaries -----	\$ 7 427 28	
A-2 Wages -----	2 351 99	
A-3 Legal Services -----	250 00	
B-1 Freight & Express -----	90 46	
B-2 Travel -----	1 742 20	
B-3 Telegraph & Telephone -----	109 13	
B-4 Repairs -----	39 57	
B-5 Fertilizer Bulletins -----	250 00	
C-4 Office Supplies -----	498 30	
C-12 Other Supplies (tags, etc.) -----	3 304 55	
D-2 Post Office Box Rent -----	6 00	
D-10 Association Dues -----	5 00	\$ 16 074 48

Smith-Lever Agricultural Extension Work**Exhibit B****Receipts:****Appropriations:**

Federal -----	\$177 625 31	
State (July 1, to June 30) -----	106 390 50	
Credit Balance Brought Forward July 1, 1933	564 59	\$284 580 40

Expenditures:

A-1 Salaries -----	\$242 775 73	
A-2 Wages -----	652 48	
B-1 Freight & Express -----	109 16	
B-2 Travel -----	20 060 87	
B-3 Communication Service -----	7 467 09	
B-5 Publications -----	816 07	
B-6 Heat, Light & Water -----	118 22	
C-12 Supplies & Materials -----	9 577 60	
D-2 Office Rent for Agents -----	1 593 00	
G-1 Furniture, Fixtures & Equipment ----	1 410 18	\$284 580 40

South Carolina Experiment Station Federal Funds

(Hatch, Adams, Purnell)

Exhibit C**Receipts:**

Receipts from Treasurer of the United States,
as per appropriations for the fiscal year
ended June 30, 1934.

Hatch Fund -----	\$ 15 000 00	
Adams Fund -----	15 000 00	
Purnell Fund -----	60 000 00	\$ 90 000 00

Expenditures:

A-1 Salaries -----	\$ 47 109 83	
A-2 Wages -----	14 699 26	
H-3 Special Payments -----	10 00	
B-2 Travel -----	1 613 49	
B-3 Telegraph & Telephone -----	429 92	
B-4 Repairs -----	684 32	
B-5 Publications -----	2 032 35	
B-6 Heat, Light & Water -----	66 34	
B-7 Other Contractual Services -----	221 38	
C-2 Fuel Supplies -----	105 89	
C-3 Feed & Veterinary Supplies -----	2 957 21	
C-4 Office Supplies -----	1 454 86	

SUPPLEMENTARY REPORTS

C-8	Educational Supplies -----	345 86	
C-9	Gasoline & Oil -----	392 22	
C-10	Fertilizer -----	1 232 17	
C-12	Other Supplies -----	2 382 86	
D-4	Insurance -----	60 13	
E-1	Contingencies -----	839 63	
G-1	Office Equipment -----	1 355 95	
G-4	Motor Vehicles & Equipment -----	1 276 50	
G-6	Livestock -----	454 06	
G-7	Educational Equipment -----	366 99	
G-8	Other Equipment -----	4 596 81	
H-3	Buildings -----	2 327 84	
H-5	Other Lands & Structures -----	2 984 13	\$ 90 000 00

Agricultural Research

(Reported by College Fiscal Year, paid through Office of
Comptroller General of South Carolina)

Exhibit D**Expenditures:**

A-1	Salaries -----	\$ 22 938 00	
A-2	Wages -----	6 750 40	
B-2	Travel -----	2 126 40	
B-3	Telegraph & Telephone -----	83 39	
B-4	Repairs -----	833 51	
B-5	Printing -----	1 076 77	
B-6	Water, Heat, Light & Power -----	408 90	
C-3	Feed & Veterinary Supplies -----	728 55	
C-4	Office Supplies -----	374 53	
C-9	Motor Vehicle Supplies -----	1 459 02	
C-10	Agricultural Supplies -----	4 021 73	
C-12	Other Supplies -----	437 96	
D-2	Rents -----	530 00	
G-8	Other Equipment -----	543 82	\$ 42 312 98

Crop Pests and Diseases

(Reported by College Fiscal Year, paid through Office of
Comptroller General of South Carolina)

Exhibit E**Expenditures:**

A-1	Salaries -----	\$ 3 685 66	
B-2	Travel -----	142 15	
C-4	Office Supplies -----	145 12	
C-9	Gasoline & Oil -----	265 70	
G-4	Motor Vehicles -----	467 00	\$ 4 705 63

Livestock Sanitary Work

(Reported by College Fiscal Year, paid through Office of
Comptroller General of South Carolina)

Exhibit F**Expenditures:**

A-1	Salaries	-----	\$ 21 912 44	
A-3	Special Payments	-----	979 25	
B-2	Travel	-----	3 443 02	
B-3	Telegraph & Telephone	-----	77 15	
C-4	Office Supplies	-----	5 88	
C-12	Other Supplies	-----	358 50	
D-9	Contributions	-----	321 85	\$ 27 098 09

Truck Experiment Station

(Reported by College Fiscal Year, paid through Office of
Comptroller General of South Carolina)

Exhibit G**Expenditures:**

A-1	Salaries	-----	\$ 1 500 00	
A-2	Wages	-----	1 244 61	
B-3	Telegraph & Telephone	-----	68	
B-4	Repairs	-----	148.40	
B-6	Light, Water & Power	-----	204 44	
C-4	Office Supplies	-----	49 02	
C-9	Motor Vehicle Supplies	-----	315 65	
C-10	Agricultural Supplies	-----	1 047 49	
C-12	Other Supplies	-----	118 20	
G-1	Office Equipment	-----	135 12	
G-6	Livestock	-----	225 00	
G-8	Other Equipment	-----	766 24	\$ 5 754 85

Cadet Fund

(These funds, paid by the students for their living and other expenses,
are kept entirely separate. None of this money is used to pay
the cost of teaching.)

Exhibit H**Expenditures for Board, Laundry, Room, Uniforms, Hospital, Student Activities and Incidentals:**

A-1	Salaries	-----	\$ 12 456 09	
A-2	Wages	-----	52 858 50	
A-3	Special Payments	-----	51 48	
B-1	Freight & Express	-----	74 89	
B-2	Travel	-----	670 65	
B-3	Telephone & Telegraph	-----	446 04	

SUPPLEMENTARY REPORTS

B-4	Repairs -----	15 456 54	
B-5	Printing -----	9 823 45	
B-7	Other Contractual Services -----	1 692 79	
C-1	Food Supplies -----	89 989 11	
C-2	Fuel Supplies -----	10 395 80	
C-4	Office Supplies -----	300 26	
C-5	Laundry Supplies -----	2 570 13	
C-6	Medical Supplies -----	1 612 04	
C-7	Refrigerating Supplies -----	30 00	
C-8	Educational Supplies -----	567 90	
C-9	Motor Vehicle Supplies -----	560 67	
C-11	Uniforms -----	27 294 09	
C-12	Other Supplies -----	12 195 21	
D-1	Payment of Debt (Field House) -----	5 500 00	
D-2	Post Office Box Rent -----	1 50	
D-3	Interest (Field House) -----	759 30	
D-4	Insurance -----	989 68	
D-10	Other Fixed Charges -----	1 026 65	
G-1	Office Equipment -----	617 96	
G-2	Medical Equipment -----	261 45	
G-3	Household Equipment -----	369 73	
G-4	Motor Vehicle Equipment -----	300 00	
G-7	Educational Equipment -----	262 81	
G-8	Other Equipment -----	1 382 61	\$250 517 33
	Total Expenditures -----		\$250 517 33
	Refunds to Students -----		3 319 63
	Total -----		<u>\$253 836 96</u>

Balance on Hand July 1, 1933 ----- \$ 12 286 93
 Balance on Hand June 30, 1934 ----- \$ 15 174 04

Student Banking Account

Exhibit I

Year Ended June 30, 1934

Balance on Hand July 1, 1933 -----	\$ 11 224 16	
Deposits, Current Year -----	109 097 14	\$120 321 30
Checks—Paid Current Year -----	\$113 779 92	
Balance June 30, 1934 -----	6 541 38	<u>\$120 321 30</u>

REPORT OF DIRECTOR OF EXTENSION

Dr. E. W. Sikes, President
The Clemson Agricultural College
Clemson College, South Carolina

Dear Dr. Sikes:

I am submitting my annual report for the fiscal year 1933-1934. Since this report is prepared in August, 1934, and the results from demonstration work are mainly on a crop year basis, the figures given showing results are necessarily for the year 1933.

For the last few years South Carolina farmers, as well as farmers all over the nation, have been facing a steadily declining cash income. This situation has had its influence upon members of the General Assembly. In the first draft of the appropriation bill of the Ways and Means Committee made in January the State Smith-Lever item was cut and the items for home and farm agents' salaries and stenographic help were entirely omitted. Through much effort on the part of extension supervisors, both men and women, and the strong support of the friends of the work, the item for home and farm agents' salaries was restored. As first passed by big majorities in both the House and the Senate the extension items carried only fairly heavy cuts, but when the report of the Free Conference Committee was finally adopted in May the State Smith-Lever fund was so drastically cut that we did not have sufficient funds to offset the Federal funds allocated to South Carolina.

During these same months the Federal appropriations for extension work were also under fire.

While we have been called upon to exert more effort to serve the farm people in agricultural interests, we feel that the efforts have been appreciated and that extension work has justified all of the money devoted to it. In this state the results of the Agricultural Adjustment Administration work has left a very favorable impression upon the people. The destruction of cotton at one time was thought to be a very radical move, but the improved price of cotton, together with benefit payments, has generally met the approval of the individual farmer and those interested in the welfare of the farmer.

Respectfully submitted,
W. W. LONG, Director.

ADMINISTRATION

The early efforts in the South of the Extension Service were devoted to cultural methods; a little later better seed and soil fertility were emphasized. In this way the foundation was laid for crop production. This policy was pursued until recent years; since then a diversified agriculture has been recommended and greater emphasis placed on aiding the

farmer in solving his marketing problems and giving instructions in grading, standardizing, and packing products of the farm; and special attention has been given to farm management and rural economics.

In the past it has been very evident that the banking system or farm credit was very inadequate. The present set-up of the Farm Credit Administration, which includes (a) Federal Land Bank, (b) Bank for Cooperatives, (c) Intermediate Credit Bank, and (d) Production Credit Corporation, offers credit facilities for the farmer which heretofore were not available. It is hoped that these credit organizations will function satisfactorily. At least, this step indicates that the Federal Government has definitely decided to work out a satisfactory farm credit system.

During January, 1933, the program of work was made as usual by the Extension Service. These plans were just getting under way when the entire personnel of the Extension Service with the exception of the Home Demonstration force was engaged in the program of the Agricultural Adjustment Administration, especially in reference to cotton and tobacco. It was necessary, therefore, that the entire force devote its time to crop production control measures. Consequently, the regular demonstrations which were outlined in the program of work earlier in the year were seriously handicapped. However, the county agents in addition to emergency work did carry to conclusion quite a large number of demonstrations. Summaries or abstracts of these demonstrations are given.

HOME DEMONSTRATION WORK

This work has been continued along the same lines as heretofore. Headquarters are at Winthrop College, Rock Hill, South Carolina. A home demonstration agent has been maintained in each county of the state under the terms of the state act of 1929. Two district agents, an assistant state agent, a state agent, and five specialists, and 47 county home demonstration agents are employed in this line of work. A full report has been submitted by Miss Lonny I. Landrum, state home demonstration agent, hence no report will be included here, other than to say this work has been carried on in a very satisfactory manner and that people of the state seem to appreciate the value of it more than ever under the present adverse economic conditions.

LOCAL COLORED AGENTS

This work has been conducted along the same lines as heretofore. Headquarters are at State College, Orangeburg, with M. F. Whittaker, president. H. E. Daniels, assistant district agent, has made a full report which has been submitted, hence no report on the colored agents' work will be included.

EMERGENCY WORK

1. Rural Electrification:

In February, the Governor of South Carolina appointed a committee to study the possibilities of a rural electrification program throughout the state. The Extension Service was asked to make a survey by counties of the potential uses, market, and active demand for electric power and service. This survey was completed and a report given the committee within two weeks.

2. Crop Production Loans:

Beginning March 15 the county agents, cooperating with representatives of the Crop Production Loan Office, set up the necessary county organizations for the handling of the crop production loans. This loan work required a mass of detailed and intensive work on the part of the county agents. Because of the lateness of the passage of the enabling act by Congress, this tremendous amount of work had to be done at high speed in order for the farmer to receive his loan in time to plant. By April 30, 60,000 applications for these loans had been received, passed upon, and forwarded to Washington by the county agents and loan offices. Approximately 60,000 were approved by the Washington office for a total of \$6,185,115.

3. Cotton Acreage Reduction:

Early in 1933 the economic condition of South Carolina farmers, like all U. S. farmers, was very critical. In 1932 the American cash farm income was \$4,201,000,000. In 1926 it was \$9,658,000,000. The gross income for the entire 1932 crop of cotton of the South was only \$425,000,000, whereas at normal or parity prices the crop should have returned over one billion dollars. The prevailing price that South Carolina cotton growers received for their 1931 and 1932 crops was five to six cents. Farm surpluses in all crops were increasing. At the beginning of 1932-33 cotton season, 13,000,000 bales of cotton were on hand. These conditions were responsible for the passage of the Agricultural Adjustment Act.

Beginning in June, after the passage of the Agricultural Adjustment Act, the responsibility of making this Act effective as applied to cotton production control was placed upon the Extension Service. The extension organization was in entire charge of "the plow-up campaign". Only a person that was in intimate contact as a part of the work can realize the overwhelming obstacles that had to be, and were, overcome in carrying out his project.

The splendid work of the members of the Extension Service could not have accomplished the tremendous tasks presented by the cotton acreage reduction campaign without the whole-hearted and sincere cooperation and assistance received from the Smith-Hughes organization, committeemen, business and civic organizations, the Grange, the South Carolina Department of Agriculture, individual interested business men,

land mortgage companies, county, state, and national officials. These organizations and individuals worked long and hard, often at a great personal sacrifice, toward the successful conclusion of the campaign.

The Extension Service, guiding the county organizations, made the estimates of acreage and yield, made out, examined and approved the contracts and certificates of performance, received and distributed checks, upon which the U. S. Government paid out \$4,776,644.17 and options on 184,496 bales of cotton.

As a result of the cotton acreage reduction in the South, the gross income of 1933 crop of cotton with improved prices and rental benefit payments was more than \$850,000,000 compared with approximately \$425,000,000 for 1932.

4. Tobacco Sign-Up Campaign:

In September the tobacco farmers of the Pee Dee Section of the state became very much dissatisfied with the prices being paid for their product. The Governor of South Carolina, in cooperation with the Governor of North Carolina, closed the South Carolina and North Carolina markets for flue-cured tobacco for approximately three weeks. During this period the Agricultural Adjustment Administration, working with committees from both states, formulated a plan for tobacco acreage control. An immediate action was the calling for tobacco farmers to sign an agreement to accept the final contract with the Agricultural Adjustment Administration for tobacco acreage control in 1934-35. The county agents of the eleven interested South Carolina counties were designated as the ones to conduct this campaign.

As in the crop loan and cotton acreage reduction work the Extension Service again had to set up an organization and complete a tremendous task in a very short space of time. Within five days after the receipt of the agreement forms approximately 95 per cent of the tobacco farmers had signed the agreements. The quick and successful conclusion of this campaign permitted the markets to again open and led to the tobacco farmers receiving much more satisfactory returns for their tobacco through better auction prices and adjustment payments to be made under the formal 1934-35 tobacco contract from the Agricultural Adjustment Administration.

5. Other Emergency Work:

In addition to these major statewide emergency programs the Extension Service fulfilled innumerable requests for special assistance, such as aiding R. F. C. garden and canning projects; preparing plans for county farmer storage, processing, and market units; location of C. C. C. camps; soil erosion projects; commodity credit loans; hog control program; soil analysis survey; organization of Farm Credit Associations; assisting Regional Agricultural Bank; The Grange; compiling lists of processors of hogs, corn, milk for Internal Revenue Department; working out codes for fluid milk producers, truck crop growers, and poultry producers, etc.

The impartial observer, even though only slightly acquainted with these many new emergency duties, can readily perceive that they have required a tremendous amount of time, labor, mental concentration, good judgment, and executive ability. The observer wonders if any time was available for attention to regular extension demonstrations. Report on the regular demonstration work will follow.

AGRONOMY

During January, 1933, plans were made by the agronomy specialists to conduct demonstrations throughout the state showing the economic production of all field crops adapted to South Carolina conditions. These plans were just well underway with planting of the various crops proceeding, when the entire specialist personnel of the division was transferred to the Agricultural Adjustment Administration as agricultural emergency agents in various counties.

At the same time the attention of all county agents in the state was necessarily given almost entirely to the crop production control measures. Naturally the work of carrying these demonstrations to a successful conclusion was seriously handicapped. This was especially true with agronomy demonstrations as the two major crops in this state are cotton and tobacco and both of these crops came under the production control programs.

Impossible as it seems, the county agents did find time to carry to conclusion quite a large number of agronomy demonstrations.

The work in agronomy covers all field crops and pastures other than horticultural crops or truck crops. It includes work on soils, fertilizers, varieties, methods of cultivation, harvesting, crop improvement by seed breeding and selection, and all phases of crop production.

Agronomy Problems Receiving Attention

1. South Carolina cotton mills consume annually approximately 1,000,000 bales of cotton of 15/16 inch or longer staple length. In 1926 only 15 per cent of the state's crop met this requirement. The 10-year average yield of lint, 159 pounds per acre, is below the cost of production. Steady improvement is being made in the quality and yield per acre but more improvement is needed.

2. The average yield per acre of food and feed crops indicates, together with cost of production records, that larger yields per acre must be obtained for economic production. Total yields of the state compared with total requirements show that the total yield must be increased by larger yields per acre, larger acreage, or both.

3. Increasing the productive power of the soil is a major problem in all lines of agriculture. Too great a dependence has been laid upon the use of commercial fertilizer. It is imperative that the productive ability of the soil be increased by more permanent and cheaper means, such as animal and plant manures.

4. The tobacco crop of South Carolina produces a gross income of 16 to 20 million dollars annually but due to low yields and low quality and high cost of production, the net income has been small. A higher yield of better quality leaf must be secured.

5. Certain counties of the state need a supplemental cash field crop. Peanuts fill this need to some extent and the development of a larger acreage and yield per acre is desirable.

6. There are a number of miscellaneous crops suitable for special conditions. As such special problems come to light, demonstrations in the interested communities or sections of the state must be planned to show the most economical method of meeting the need.

ANIMAL HUSBANDRY

Beef Cattle:

Beef cattle production in South Carolina has shown some progress during the year. A few herds have been established and a number of other herds have been increased in numbers.

Assistance has been given feeders in the marketing of fat cattle during the spring of 1933. Most of the feeders have about come out even and a few made a little money in spite of the low prices.

The show and sale of cattle at Savannah on April 7 was the combination of a cooperative effort on the part of Georgia and South Carolina beef producers and extension folks. It is probable that this show and sale will become an annual event.

The Farm Meat Supply:

The generally widespread interest in preserving a supply of meat for use on the farm was to a large extent influenced by the price of hogs during 1933, which ranged around 48 per cent of the pre-war value, while retail prices of meat were 103 per cent of the pre-war value. In addition to meat for home use, many farmers cured hams for sale to the retail trade and other cuts of meat for supplying the needs of laborers on their farms.

Assistance was given county and home agents in holding 20 pork cutting and curing demonstrations and four beef cutting and canning demonstrations. We find that the practice of canning beef on the farm is increasing quite rapidly.

During the summer a bulletin was prepared on the subject of canning meats on the farm.

We have cooperated with the managers of a number of ice plants which have undertaken the curing and storing of meat.

DAIRYING

It seems proper to record the emergency interference with the work in extension dairying. From June 26 to July 15 the dairy specialist was employed in the cotton plow-up campaign in York county. Between July 15 and September 15 the dairy specialist worked at the request of the

larger milk marketing centers of the state on the preparation of marketing milk agreements under the Agricultural Adjustment Administration. On September 18 the dairy specialist was called to Washington on leave of absence to work with the dairy section of the Agricultural Adjustment Administration on market milk agreements.

The dairy specialist was elected secretary-treasurer and sales manager of the South Carolina Guernsey Cattle Club at the club's annual meeting on January 19, 1933. This year's activities were looked upon by the breeders as the most important of any year of its history because of the fact that this year was the bottom of the depression and the future course of Guernsey breeding in the state would be determined by the results of the breeders' activities during that year. Because South Carolina has attained a southeastern reputation as a Guernsey breeding state the Extension Service felt that no stone should be left unturned to preserve this industry through the depression.

The club was urged to continue its unbroken history of annual sales despite the rather discouraging outlook. A great deal of care was exercised in selecting and advertising the cattle for the sale. As a result, 31 head of cattle were sold on May 2 for an average of \$181.98 per head, which was approximately \$41 per head higher than the 1932 average. The results of the sale were commented upon favorably by Guernsey breeders elsewhere.

Milk Consumption Campaign

The Newberry milk producers and distributors requested a milk consumption campaign, which culminated in a successful nutrition school conducted the week of April 23 to 30.

Market Milk Agreements

Following the set-up of the Agricultural Adjustment Administration after March 4, Columbia, Spartanburg, Greenville, Greenwood, Charleston, Florence, and Lancaster requested the dairy specialist's aid in the preparation of milk marketing agreements. Agreements were prepared and presented to the dairy section for the signature of the Secretary of Agriculture. Meanwhile, temporary mutual agreements were formed within each of these markets which would tend to save them from chaos. Immediately thereafter the dairy specialist was called to Washington for work with the dairy section.

Calf Club Work

Calf club work was the only project in dairy extension on a yearly basis which was carried through the year. Immediate supervision of this project throughout the year was under the state boys' club agent.

HORTICULTURE

In horticulture the sub-projects of home orcharding, commercial orcharding, home gardening, truck and market gardening, and special crops were handled as in the past. Results will be briefly given.

Home Orchards:

The value of home orchards was demonstrated this year as in the past, but well kept records were lacking because of the horticulturists being engaged in AAA emergency work.

Commercial Orchards:

Some records were obtained which showed that even though prevailing prices were low, profits were made. The apple plantings are located in the foothills of the mountains, while the peach industry is located in both the Sandhills and the Piedmont. Many new peach plantings have been made in the state in recent years.

Home Vegetable Gardening:

This project was conducted as in the past, to the further encouragement of more and better home gardens as an aid in subsistence farming.

Special Crops:

With sweet potatoes, tomatoes, asparagus, and Irish potato enterprise records, demonstrations were carried on as a joint project in horticulture and agricultural economics.

In the Irish potato enterprise records there was obtained during the year some information that seems not to have been secured in the South previously.

On the 38 farms, soil samples were taken in the potato root zone. More than one-half of the samples showed that the pH range was far below the optimum for potatoes. As a result of these analyses, the growers are attempting to solve their soil acidity and magnesium deficiency problems, which fortunately are economically taken care of by the addition of judicious use of dolomitic or magnesium limestone and in the inclusion in the fertilizer formula of sulphate of potash-magnesia.

CROP INSECTS AND DISEASES

Because of the resignation of the entomology specialist this report covers only the period of December 1, 1932, to June 30, 1933.

Because of unsettled financial conditions few field trips were made. Much of the work was conducted from the office and field trips were made only for instructing county agents and investigating outbreaks of insects and diseases.

Attention was given as needed to control of the boll weevil, cotton wilt, the Southern corn stalk borer, the corn billbug, the Mexican bean beetle, the Harlequin bug, the squash bug, the Argentine ant, and sweet potato rot losses.

BEE WORK

Bee work consisted of giving demonstrations of cleaning the hives and getting the bees in condition to gather the honey flow, also helping the beekeepers of this state who ship bees to Northern markets in packages.

On June 28 the bee specialist was transferred to Anderson county on the cotton plow-up work, and remained there for the rest of the year.

POULTRY

Poultry extension work is organized with a specialist at Clemson College and one at Winthrop who work together with farm and home agents and the people in various counties in the development of a sound poultry industry.

Demonstration Flock Records

The demonstration flock records were continued in 1933 as in former years.

In spite of the low prices of poultry products and the rising feed prices in the fall, the record keepers made some money. The 91 farmers who completed their records made a net profit of \$0.94 per hen with an average flock of 143 birds.

Short Course or Poultry Schools

During January and February, 21 poultry schools were held throughout the state with an attendance of 400 adults. The fourth poultry short course was held at Clemson, August 29-31, with an attendance of 70 adults.

Poultry Organization

Close cooperation is given the South Carolina Poultry Improvement Association because it has been a big factor in improving the poultry industry of the state. Only three county associations functioned during the past year. These organizations held meetings monthly during the year and their activity was to purchase feed collectively.

Chicken Pox Prevention

Chicken pox is probably more prevalent in South Carolina than any other one poultry disease.

Results at the College Experimental farm show that a home-made virus can be used with good results to prevent chicken pox, roup, and canker, and that it does not require any particular skill to prepare the virus.

In order to supply farmers with full information on vaccinating, a circular was written on chicken pox prevention for distribution. With the assistance of the county agents, 33 vaccinating demonstrations were given.

In the winter after the period when roup, canker, and chicken pox usually break out, a questionnaire was sent to the 33 people on whose farms meetings were held and also to the 27 who did their own vaccinating. Reports showed that on a total of 60 farms 11,881 birds were vaccinated with a total of 64 birds dying when vaccinated.

Poultry Demonstrations in Women's Clubs

Thirty-two counties undertook definite poultry work among the clubs for women, giving two or more poultry meetings during the year, while 135 clubs with 1,620 members selected two or more poultry demonstrations and practices.

Local leadership work is conducted in poultry management through poultry leaders who are chosen by the clubs to represent their group at training meetings held with the poultry specialist.

4-H Poultry Club Work

The home demonstration agent has direct supervision of 4-H poultry club work in the county. The agent arranges to present the project to all boys and girls between the ages of 10 and 16 years in the various communities in which poultry work is desired. The club is organized with president, vice-president, and secretary, elected by the members. Monthly meetings are held and the agent presents lessons and demonstrations outlined in bulletin form by the specialists.

The 4-H poultry organization is making a gradual transition from the old regular project, to the major project. In 1933 the major 4-H poultry club project was carried on in 23 counties with 175 out of the 195 members enrolled completing their year's work.

4-H Egg Laying Contest

The seventh 4-H egg-laying contest finished its 11 months' competition September 30, with the Rhode Island Reds owned by Marguerite McCown, Anderson, capturing both high honors. These five hens led all other pens in total production for the 11 months with 896 eggs to their credit, which exceeded the high pen last year by 82 eggs.

Brick Brooder Demonstration

The brick brooder has been used in South Carolina for five years and each year several hundred new brooders are constructed. This brooder meets the needs of many farmers because it is easy to build and is very inexpensive to construct and operate.

BOYS' 4-H CLUB WORK

In South Carolina 276,821 boys and girls between the ages of 10 and 20 years live on farms. Of this number of potential club members there were 6,169 white boys and approximately 10,000 white girls enrolled in club work in 1933.

Four-H club work is under way in all of the 46 counties, supervised by the county and district agents, and by subject matter specialists. White club boys completed 3271 demonstrations in 1933 having a total value of \$131,165.30 and total profits of \$64,696.62.

Other phases of club work carried on during the year included:

Contests: National meat, corn, and cotton contests were participated in, and prizes and medals awarded to county and state winners.

National Club Gatherings: Two 4-H club boys represented the state at the National Club Camp, held in Washington, D. C., and one club boy represented South Carolina at the National Club Congress at Chicago.

Fairs: Club members exhibited crops and livestock in various county fairs and the State Fair.

Summer Camps: A total of 1846 club boys from 32 counties attended summer camps. Many of these camps were held at the new permanent South Carolina 4-H club camp, near Aiken.

Rural Recreation Institutes: During the spring four institutes were held in centrally located places, under the supervision of a representative of the National Recreation Association and the club specialists.

AGRICULTURAL ECONOMICS

Farm Account Work:

This work was begun in 1932. About 180 records books were started in 1933, but because of the cotton acreage reduction campaign there was practically no follow-up work either by the specialist or the county agents. As a consequence, only 53 books were completed and turned in for summary and analysis at the end of the year.

Enterprise Records:

About 150 enterprise records were started, principally records of peach, Irish potato, sweet potato, and asparagus enterprises. About 70 of these records were completed and turned in and were summarized and analyzed. Enterprise records were secured also on tobacco and home gardens.

Outlook and Economic Information:

During early January, three one-day outlook schools for county agents were held, to train county agents in properly giving out outlook information to farmers, and Circular 127, "Agricultural Outlook for South Carolina, 1933", was published.

Emergency Agricultural Work:

Because of the emergency agricultural work and other work engaged in with the Farm Credit Administration the completion of the program of work as planned at the beginning of the year was very seriously handicapped.

PUBLICATIONS

During the year two bulletins, six circulars, and one poster were issued as follows:

Bulletin 93, Factors Involved in Successful Canning in South Carolina.

Bulletin 94, Canning meats on the farm.

Circular 126, Home-mixing of Fertilizer.

Circular 127, Agricultural Outlook for South Carolina, 1933.

Circular 128, Chicken Pox Prevention.

Circular 129, Cotton Reduction Campaign.

Circular 130, Brooding Chicks.

Circular 131, Feeding Laying Hens.

Poster 29, Granville Wilt.

News Service Material Issued

A total of 366 mimeographed news letters were issued during the year carrying spot news and information about agricultural matters to the newspapers of the state, and 26 stories were given to the Associated Press carrying important spot news.

Thirty-four feature stories dealing with agricultural progress and important, timely, pertinent informational material were sent out and published in the daily papers of the state and in farm journals.

From May 1 through the year a very considerable percentage of the news service work was in the promotion of the AAA activities. Both local source material and material adapted from information out of Washington were used in this connection.

MARKETING

The marketing office of the Extension Service is located in Columbia where it is in constant contact with marketing problems of the entire state.

The majority of the fruit and vegetable crops are handled through cooperative marketing organizations or other farmers' marketing organizations. Since practically all of the marketing associations had requested assistance in standardizing the commodities handled a large part of the time of the Division of Markets was given to the standardization project on fruits and vegetables which includes the shipping point inspection service. Work was carried on in connection with the marketing of asparagus, Irish potatoes, peaches, tomatoes, and sweet potatoes.

In the inspection work on asparagus many individual demonstrations are given and some 1,000 growers are reached by the inspectors. Special attention is given new growers who are shipping for the first time and to growers who previously have not been shipping under association standards. The managers of the two larger associations expressed themselves as highly pleased with the inspection service and have indicated their intentions of using it again.

The Irish potato shipping organizations did not use field men this season because of a lack of finances and the fact that they were trying to cut the marketing cost to the minimum. There still seems to be

room for improvement in methods of harvesting, grading, and packing. All the organizations seemed to be well satisfied with the inspection service this season and expressed a desire for it in 1934.

The total number of cars of peaches inspected this year was 457, or 63 per cent of the total shipped.

The peaches as a whole were of good quality, and the growers maintained their reputation for a quality pack. Practically all of our growers have had two or more years' experience in harvesting and packing, and they showed their desire for a quality pack by cooperating with the inspectors to the fullest extent.

The tomato growers, as well as the shipping organizations, seemed very appreciative of the assistance rendered on the tomato deal at North this season. Returns were so satisfactory that growers indicated that the tonnage may total a thousand acres in 1934.

Although considerable work has been attempted on sweet potatoes by the Inspection Service, it seems that very little headway has been made with the growers on standardization because of the fact that this crop is usually considered as a sideline and it has been difficult to interest the producers in the correct type of seed and the production of a quality crop. A plan of demonstrating to the growers how to properly grade potatoes and in turn helping them make their first sale to a dealer was carried on in Richland, Aiken, Berkeley, and Spartanburg counties. Several of the growers who came to us for assistance were able to dispose of their entire crop in this manner.

In preparing for this demonstration in the proper handling and marketing of sweet potatoes, we made a survey and found that a large number of the growers are now using tobacco barns for curing sweet potatoes. A total of 135 barns were reported to our office as being used this past season.

In addition to the crops already named, work was also carried on with cabbage, cucumbers, cantaloupes, watermelons, and strawberries.

Lake City Auction Markets

The acreage of truck crops in the Lake City section has increased considerably during the past few years, and although the growing season was very unfavorable this year and average yields relatively low, approximately 330 cars moved out of this area.

The local truck buyers at Lake City this season decided that they would try the auction method of handling vegetables. They organized the Lake City Truck Buyers Board of Trade for the purpose of carrying out the necessary financing and handling of other matters in connection with the auction market. All vegetables offered were inspected by experienced inspectors furnished by the Division of Markets. Quite an improvement was noticed in the quality of the packages during the latter part of the season, and if this system is carried through another year,

it is evident that the quality of the vegetables moving from this section will be greatly improved. Some of the buyers report that they were able this year to compete favorably with stock from the lower Mississippi Valley and also from California.

Poultry Marketing

Shipments of poultry from the state this year totaled 979,949 pounds, which sold for \$100,470.91, as compared to 1,435,368 pounds, which brought \$208,167.94 in 1932. Reduced to a carlot basis, there were 61 cars this season, against 90 cars in 1932. These shipments served a total of 17,451 growers.

The reports of the tonnage moved by these cooperative carlot schedules, however, do not represent the actual production within the state, as the local prices were considerably better than those that could be secured on the terminal markets. For this reason a large amount of the poultry produced in the state during 1933 was sold either locally or to other nearby southern markets, whereby the average price to the producer was considerably higher than the carlot prices. It was not possible, however, to move all of our poultry to these local markets and absolutely necessary to continue our cooperative schedules.

REPORT OF BOARD OF VISITORS

To the Board of Trustees
The Clemson Agricultural College
Clemson College, South Carolina

Dear Sirs:

The Board of Visitors for the year 1934 herewith submits to you the report of its two-day inspection of Clemson College on May 2, 3, 1934.

The following members of the Board were present: J. E. Harley, Barnwell, a hold over member from last year; T. W. Thornhill, Charleston; Winchester C. Smith, Williston; J. M. Moss, St. Matthews; S. Dean Pearman, Anderson; Lewis C. Harrison, Walhalla; S. C. Gambrell, Owings; J. D. Jones, Union; W. B. Wilkerson, Hickory Grove; Paul Quattlebaum, Conway; A. V. Bethea, Dillon; G. G. Gilmer, Chester; and J. R. Conner, Eutawville.

J. E. Harley was elected chairman, W. B. Wilkerson secretary, and T. W. Thornhill the hold-over member for 1935.

The board gathered at the Trustee House at 1:20 where a delightful lunch was served. Mr. J. H. Woodward greeted us on our arrival and escorted us as we visited the various departments of the college.

Wednesday afternoon was spent in inspecting the Engineering Department, the Agricultural Department, the dairy barn, the swine barn, the college farm, the experiment station, and the Textile Department. All these were found to be in good condition. We were next shown through the Y. M. C. A. building and told of the work of the Y. M. C. A. in the training of the spiritual and physical life of the cadets.

After viewing cadet retreat, the board adjourned to the training room where another delightful meal was enjoyed. Immediately after supper Dr. Sikes gave an illustrated lecture, on the history of the college and its development, that was very interesting. At the conclusion of the lecture Mr. J. C. Littlejohn, business manager of the college, outlined and illustrated the very complete budget control and auditing system now in operation at the college. These lectures were very impressive, and the board wishes to commend Dr. Sikes and his assistants very highly for the efficient manner in which they operate the affairs of the college, even to the smallest detail.

Thursday morning Mr. W. H. Washington, dean, School of Vocational Education, told the board of the many thousands that Clemson is reaching through its vocational teachers and gave an outline of the work being done.

The board next visited Dr. Daniel, and then the Physics Department, where we found well equipped laboratories and sufficient class-room space to take care of the needs of this department. The board wishes to commend those in charge for their efforts in furnishing the large amount of physics equipment at such a small cost to the college.

The next stop was the hospital, where much improvement in equipment was noted; and the board wishes to commend Dr. Lee W. Milford for the very efficient manner in which he is looking after the health of the cadets.

Following this the board visited the Extension Department, the Chemistry Department, the mess hall, kitchen, and barracks, and then witnessed a most impressive dress parade on the drill field. After a short conference in the president's office, attended assembly in the auditorium, visited the athletic field house, ate dinner with the cadet corps in the mess hall, and reassembled at the Trustee House to make our report.

The board wishes to make the following recommendations: First, It is our opinion that the greatest need of the college at this time is an adequate agricultural building. The board thinks it imperative that something be done at the earliest possible moment to provide such a building in keeping with the needs of the college, and urges that you use your best efforts to this end. Second, That the textile building be enlarged and more modern equipment added as soon as funds are available; Third, That the engineering building be provided with a Deisel engine to make its equipment complete—otherwise this building is well arranged and equipped. Fourth, That each building be marked by name so that strangers might be able to locate them. Fifth, That a sufficient number of students be detailed to serve as guides on Sundays to direct and escort to the various points of interest the many visitors who come to the college.

The board is very much impressed with the many improvements found in every department of the college. The buildings, and equipment are all well preserved and the grounds are most attractive at this time.

During these years of depression and small appropriations, the college has not only maintained its high standard of efficiency but has gone forward along all lines. Too much praise cannot be given all those connected with the college in any capacity who have labored unselfishly to make this success possible. The board is impressed with the general excellence of the various departments, and with the enthusiasm, loyalty, and ability of the directors and assistants.

It is a pleasure to see the fine spirit of cooperation manifested between the administrative officers, the faculty, and the corps of cadets. It does seem that every thing possible is being done to provide pure, wholesome food, good medical attention, and the proper kind of recreation to develop the physical body; while the minds are trained by a most loyal group of very able and efficient instructors, so as to give the best of training and development to the hundreds of young men who annually enroll at Clemson College. At the same time the religious training and

wholesome influence on the campus should be a stimulus in the building of real character in the lives of all the students.

In conclusion, the board wishes to express its sincere thanks to President Sikes, to the administrative officers of the college, and to all the professors with whom it came in contact, for the courteous treatment, and the enlightening information which they gave with regard to their particular work, and the work which the college as a whole is doing for South Carolina.

Respectfully submitted,
W. B. WILKERSON,
Secretary Board of Visitors

J. E. Harley, Chairman
T. W. Thornhill
Winchester C. Smith
J. M. Moss
S. Dean Pearman
Lewis C. Harrison
S. C. Gambrell
J. D. Jones
Paul Quattlebaum
A. V. Bethea
G. G. Gilmer
J. R. Conner



REPORT OF SECRETARY OF FERTILIZER BOARD

Dr. E. W. Sikes, President
The Clemson Agricultural College
Clemson College, South Carolina

Dear Dr. Sikes:

I beg to hand you herewith the report of the Fertilizer Department for the year beginning July 1, 1933, and ending June 30, 1934.

Very truly yours,
J. H. WOODWARD,
Secretary Board of Fertilizer Control

We began the year with the intention of using the county agents as fertilizer inspectors during the fertilizer season but owing to the multitude of duties placed upon the county agents by the federal government in its various farm activities, they were not able to do the fertilizer inspection this year, and we were forced to place our inspectors in the field again.

We have received from the fertilizer tax this year \$146,299.15, which is \$9,344.15 in excess of last year's receipts. We had appropriated for the operation of fertilizer inspection this year \$8,136. We have, by practicing the very strictest economy, used only \$6,780, leaving a balance of \$1,356, which can be applied to the operating of the college. We do not feel that it could have been possible to operate on any less this year and give service. The service rendered this year has been strictly high grade as it has in the past, and we believe the farmer has had adequate protection by the inspection of fertilizers.

The analysis of fertilizers this year shows that the grades of fertilizers used are gradually getting higher. The largest proportion of deficiencies this year seems to have been in potash but the standards have been about as good as usual.

A part of the savings mentioned above, about \$400, was due to the fact that we did not employ a stenographer this year but used Miss Culp, who was loaned to us from the Administration Office, and who has given very efficient service as part time.

REPORT OF STATE VETERINARIAN

Dr. E. W. Sikes, President
The Clemson Agricultural College
Clemson College, South Carolina

Dear Dr. Sikes:

I have the honor to submit a report for the Clemson College Live-stock Sanitary Department and the Bureau of Animal Industry, U. S. Department of Agriculture, cooperating, for the fiscal year ending June 30, 1934.

Our principal projects and results obtained are summarized as follows:

TUBERCULOSIS ERADICATION

The testing of all cattle for bovine tuberculosis was completed in the counties of Berkeley, Calhoun, and Aiken during the past year. With the completion of the work in these counties we have a total of 36 counties in which all cattle are regarded as being free of tuberculosis and are recognized as such by all states in the Union. The following is a list of the Modified Accredited counties:

Abbeville	Kershaw
Aiken	Lancaster
Anderson	Laurens
Berkeley	Lee
Calhoun	Lexington
Cherokee	McCormick
Chester	Marion
Chesterfield	Marlboro
Clarendon	Newberry
Darlington	Oconee
Dillon	Pickens
Edgefield	Richland
Fairfield	Saluda
Florence	Spartanburg
Georgetown	Sumter
Greenville	Union
Greenwood	Williamsburg
Horry	York

Because of limited funds for this class of work the number of cattle tested during the past year was not as great as in former years; we tested, however, a total of 6,232 herds containing 25,744 head of cattle and of this number 11 head reacted to the test and were slaughtered under the requirements of state and federal laws.

SUPPLEMENTARY REPORTS

The following summary is the present status of our tuberculosis eradication:

Accredited counties -----	36
Accredited herds -----	108
Accredited cattle -----	6,385
One free test herds -----	70,318
One free test cattle -----	212,938
Total herds under supervision -----	70,429
Total cattle under supervision -----	219,683

HOG CHOLERA CONTROL

While there was a decrease in swine production during the year, the interest manifested in the protection of the industry by the employment of the preventive treatment was approximately the same as in previous years.

A total of 4,229 lots and 47,728 head of hogs were treated; of this number cholera infection was found on 222 premises.

OTHER DISEASES

In addition to making investigations and assisting livestock owners in cases of contagious or infectious diseases or exposure thereto, we received numerous requests from owners for investigations of conditions that they considered of a contagious or infectious nature, that were answered promptly by either personal investigation or letter. In this class of work a total of 6,095 premises were visited during the past year.

LABORATORY

This branch of our department renders valuable assistance to the livestock and poultry owners by making positive diagnoses of conditions that cannot be made otherwise. In all cases suggestions are made for the control and eradication of the diseases. The following is a summary of the specimens examined during the past year:

Cattle -----	7,277
Chickens -----	43,953
Swine -----	24
Sheep and goats -----	20
Dogs -----	154
Horses and mules -----	14
Turkeys -----	17
Cats -----	6
Quail -----	12
Pigeons -----	17
Miscellaneous -----	8
Total -----	51,502

DEPUTY STATE VETERINARIANS

As in previous years, a sufficient number of practicing veterinarians are commissioned each year to assist this department if their services are required. This plan has proven most satisfactory as it enables us to extend efficient service to all sections of the state promptly.

BIOLOGICS SERVICE

The sale of biologics used in the preventive treatment of contagious and infectious conditions of livestock is summarized as follows:

Anti-hog Cholera Serum (cc.)	-----	1,679,150
Hog Cholera Virus (cc.)	-----	119,550
Miscellaneous Biologics (doses)	-----	32,911

Respectfully submitted,

W. K. LEWIS,

Inspector in Charge and
State Veterinarian

REPORT OF CHIEF CHEMIST

Dr. E. W. Sikes, President
The Clemson Agricultural College
Clemson College, South Carolina

Dear Dr. Sikes:

The following report of the analytical work of this Department on commercial fertilizers, waters, etc., done for the Board of Fertilizer Control, and for the citizens of the State, and for other departments of the college during the year ending June 30, 1934, is respectfully submitted.

For the sake of comparison, the figures for last year are given side by side with those for this year:

	1932-33	1933-34
Official samples of fertilizers -----	1,226	1,046
Farmers' samples of fertilizers-----	25	27
Waters -----	23	31
Ores, minerals, rocks, etc., for identification----	28	20
Ashes (wood) -----	3	3
Limestones, marls, and lime -----	4	5
Miscellaneous -----	43	30
	<hr/> 1,352	<hr/> 1,162

OFFICIAL FERTILIZER SAMPLES

Classification	1932-33	1933-34
Complete Fertilizers -----	928	855
Special Mixtures (Phosphoric Acid and Ammonia)	10	5
Superphosphates -----	40	35
Superphosphates with Potash -----	0	1
Cottonseed Meals -----	22	16
Nitrate of Soda -----	90	62
Potash Salts -----	59	48
Dried Blood -----	3	1
Fish -----	1	0
Tankage -----	1	1
Sulphate of Ammonia -----	54	10
Miscellaneous -----	18	12
	<hr/> 1,226	<hr/> 1,046

The 12 miscellaneous samples consist of: four home mixtures; three mixtures containing only ammonia and potash; one "Cal-Nitro"; three ground phosphate rock; and one potassium nitrate.

Deficient Samples

Of the 1,046 samples considered in this discussion, 94 were found deficient beyond the limits allowed under the law.

In available phosphoric acid -----	6
In ammonia -----	24
In potash -----	36
In available phosphoric acid and ammonia -----	6
In available phosphoric acid and potash -----	4
In ammonia and potash -----	16
In available phosphoric acid, ammonia and potash -----	1
In available water insoluble ammonia -----	1

94

In addition to the 94 samples deficient beyond the limits allowed under the law, there were 364 samples found deficient below guaranteed analysis in one or more ingredients as follows:

In available phosphoric acid -----	25
In ammonia -----	168
In potash -----	114
In available phosphoric acid and ammonia -----	13
In available phosphoric acid and potash -----	5
In ammonia and potash -----	35
In ammonia, phosphoric acid and potash -----	4

364

Last season out of 1,226 samples 343 were deficient in one or more ingredients.

AVERAGE OF ANALYSES

	1932-1933		1933-1934	
	Found	Guar- anteed	Found	Guar- anteed
Superphosphates				
Available phosphoric acid -----	16.97	16.05	17.17	16.12
Special Mixtures				
(Superphosphates with ammonia)				
Available phosphoric acid -----	7.43	7.11	6.18	5.20
Ammonia -----	4.56	4.50	6.23	6.60
Complete Fertilizers				
Available phosphoric acid -----	8.92	8.26	8.65	8.02
Ammonia -----	3.82	3.73	4.02	3.95
Potash soluble in water -----	3.86	3.72	4.23	4.02
Cottonseed Meals				
Ammonia equivalent of nitrogen--	7.24	7.14	7.04	7.00
Nitrate of Soda				
Ammonia equivalent of nitrogen--	18.92	18.65	19.25	18.90
Sulphate of Ammonia				
Ammonia equivalent of nitrogen--	25.26	25.01	25.14	25.03
Kainits				
Potash soluble in water -----	16.00	16.16	17.23	16.73
Muriate of Potash				
Potash soluble in water -----	48.77	48.40	49.00	49.20
Sulphate of Potash				
Potash soluble in water -----	48.88	48.00	-----	-----
Manure Salts				
Potash soluble in water -----	20.23	20.45	20.43	20.29

The Fertilizer Law, effective August 1, 1933, changed the classification of ammonia from organic and mineral to water soluble and available water insoluble. The Board of Fertilizer Control subsequently ruled that the water insoluble should show an availability of 85 per cent. All brands of mixed fertilizers have been examined and while a few fell below the 85 per cent requirement, the average on the guarantee was sufficient to overbalance this shortage.

In addition to the availability determinations of the ammonia the basicity and acidity of all brands, while not required by law, has been determined.

Respectfully submitted,
B. F. ROBERTSON, Chief Chemist.

REPORT OF STATE CROP PEST COMMISSION

Dr. E. W. Sikes, President
The Clemson Agricultural College
Clemson College, South Carolina

Dear Dr. Sikes:

I am enclosing the annual report of the State Crop Pest Commission for the year ending June 30, 1933.

Respectfully submitted,
H. W. BARRE, Director.

South Carolina was among the first of the states to recognize the importance of the prevention of introduction of foreign plant pests and the spread of injurious plant pests existing within the state. The General Assembly, therefore, on April 1, 1912 passed an Act creating the South Carolina State Crop Pest Commission whose duty it is to prevent insofar as possible the introduction into and the spread within the state, of injurious insect pests and plant diseases. The regulations promulgated under this Act at the present time require the inspection and certification of nursery stock; sweet potato plants and sweet potato seed; cabbage and tomato plants; apiaries; and the enforcement of regulations concerning Phony peach disease; European corn borer; the Insecticide and Fungicide Act, in addition to various inter-state regulations both federal and state.

Attached is a brief report of the activities of the Commission for the year ending June 30, 1934.

NURSERY INSPECTIONS

One hundred and eighteen nurseries have been inspected during the year comprising an approximate acreage of one thousand. Several new small nurseries were added during the season, and a few were discontinued on account of the low prices prevailing during the past few years. There has been no material change, therefore, in the acreage or in the number of nurseries inspected. These nurseries are located in 35 of the 46 counties of the state and in them may be found most of the ornamentals as well as general nursery stock adaptable to this state. These nurseries were in good condition generally insofar as insects and diseases were concerned, though cultivation had been neglected in some. Nursery inspections are made annually unless some injurious insect or disease is found, in which case the premises are kept under surveillance until the trouble has been cleared up. All states now have regulations similar to those of South Carolina, so inspection and certification is necessary if our growers are to compete profitably with growers of other states.

The following insects representing light infestations only, were found: San Jose scale on peach, apple, and some ornamental stock; camellia scale on camellia; quince lace bug on pyracantha; Euonymus scale on euonymous; cottony cushion scale in one instance on pittosporum; red spider on various ornamentals; and bag worms on arbor vitae. Various leaf diseases are always in evidence but none has been of economic importance. In every case recommendations and instructions were given for control or eradication.

Every nurseryman is required to attach a South Carolina permit tag to each shipment going either by express or mail. For this purpose last season there were issued 4,700 tags.

Following is a list of the nurseries inspected during the season.

Name of Nursery	Kind of Stock	Acreage	Address
Aeolian Hill Nursery-----	Ornamentals	1	St. Matthews
Aikens Growers of Ornamentals-----	Ornamentals	2	Aiken
Anderson, Mrs. O. D.-----	Ornamentals	6	Anderson
Antreville Pecan Nursery-----	Pecan	1	Antreville
Atkins, Miss Susie-----	Ornamentals	1/20	Bennettsville
Atkinson, F. W.-----	Youngberry	2	Augusta, Ga.
Bluebird Nursery -----	Ornamentals	4	Easley
Blue Ridge Nur. & Bulb Fm.-----	Ornamentals	1	Aiken
Borden Nursery -----	Ornamentals	1	Rembert
Boxwood Nursery-----	Ornamentals	1	Society Hill
Brackens, A. B. Nursery-----	Ornamentals	5	Liberty
Briggs' Nursery -----	Ornamentals	1	Traveler's Rest
Bull's Nursery -----	Ornamentals	1/4	Taylors
Buckfield Plantation -----	Narcissus	400	Yemassee
Bush, James C.-----	Perennials	1/20	North Augusta
C. F. & H. Nursery-----	General	4	Andrews
Cain, Miss Caroline P.-----	Daffodils	3/4	Pinopolis
Clarke, Mrs. W. W.-----	Ornamentals	1/20	Lynchburg
Campbell, W. A.-----	Narcissus	4	Sheldon
Campobello Nursery -----	General	1/4	Campobello
Carey, F. C.-----	Ornamentals	1/4	Clemson Col.
Cannon, Mrs. Leila-----	Ornamentals	1/10	Tigerville
Carolina Floral Nursery-----	Ornamentals	10	Charleston
Carolina Pecan Nursery-----	Pecan	2	Fairfax
Cason, J. M.-----	Strawberry	1/4	Lykesland
Cheswell, Mrs. Annie-----	Daffodils	1/2	Westminster
Cherokee Gardens -----	Ornamentals	1/20	Columbia
Chrietzberg, H. F. -----	Iris	1/10	Spartanburg
Cox, J. R. -----	Pecan	1	Greeleyville
Culler, Mrs. J. W. Jr. -----	Ornamentals	1/4	Orangeburg
Curtis, J. A. & C. C.-----	Grape	1/4	McBee

Dailey's Nursery-----	Ornamentals	6	Clinton
Dantzler, M. O.-----	Pecan	1	Orangeburg
Davis, John Q. Nursery -----	Ornamentals	1 1/2	Ware Shoals
DeLoache, Mrs. Heidt-----	Ornamentals	1/10	Estill
Dibble Nursery -----	Ornamentals	2 3/4	Orangeburg
Dorr, Mrs. L. A.-----	Ornamentals	1	Belvedere
Dunean Nursery -----	Ornamentals	1	Greenville
Dunn's Nursery -----	Ornamentals	1/20	Camden
Edwards Nursery -----	Ornamentals	5 1/2	Darlington
Edwards, Mrs. T. C.-----	Bulbs	1/10	Johnston
Eidson, Mrs. A. L.-----	Bulbs	1/20	Johnston
Ellis, W. R.-----	Bamboo	1/20	Tillman
Ellis, O. B.-----	General	1/20	Level Land
Elm Abode Nurseries-----	Ornamentals	8	Columbia
Estillena Pecan Nursery-----	Pecan	2	Lena
Evergreen Nurseries -----	Privet	1/4	Conway
Evergreen Nursery -----	Ornamentals	3/4	Camden
Fant's Greenhouses -----	Ornamentals	3/4	Anderson
Fletcher, Mrs. Jasper-----	Ornamentals	1/10	McColl
Flowerland Nursery -----	Ornamentals	1	Charleston
Follin, H. G. -----	Perennials	1/2	Sumter
Gaffney Greenhouse -----	Ornamentals	1/4	Gaffney
Geraty, W. C. -----	Narcissus	25	Yonges Island
Gibson, Mrs. R. H.-----	Ornamentals	1/4	Hampton
Gillison, Mrs. Paul-----	Perennials	1/10	Seneca
Greenville Nursery Company-----	General	35	Greenville
Green Gate Gardens-----	Iris	1	Bennettsville
Green Bros. Nursery -----	Ornamentals	1	Elloree
Grove Nursery -----	Ornamentals	1/2	Marion
Guion, Mr. and Mrs. L. I.-----	General	4	Lugoff
Hamlin, T. R.-----	Privet	1/2	Mt. Pleasant
Harris, Mrs. Hunter-----	Ornamentals	1/20	Union
Harrison, Joseph M.-----	Narcissus	25	Charleston
Hoffman, G. P.-----	Bulbs	2	Charleston
Holley's Evergreen Nursery-----	Ornamentals	2 1/4	Aiken
Howell-Gillespie Nursery -----	Ornamentals	1	Taylors
Hyer, Kinyon -----	Ornamentals	1/20	Navy Yard
Jahnz, Hugo -----	Ornamentals	1/2	Summerville
Jordan, H. C.-----	Perennials	1/20	Aiken
Leck Bros. Nursery-----	Ornamentals	1 1/4	Myrtle Beach
Lockwood, A. L.-----	Gladiolus	1	Anderson
Lucas, Miss Florence LeNoble-----	Daffodils	1/2	Pinopolis
Lybering, E. L.-----	Ornamentals	2	Sumter
McGee Nursery -----	General	1/4	Anderson
Mecklenburg Nurseries, Inc.-----	Ornamentals	1	Columbia
Miller Bros. Nursery -----	Ornamentals	1 1/4	Roebuck

Mixon-Howell Nurseries -----	Ornamentals	1 1/4	Charleston
Morningside Nursery -----	Ornamentals	1	Newberry
Moss, Chas. A.-----	Ornamentals	1	Spartanburg
Newton, E. C.-----	Privet	1/4	Tatum
Oaklawn Nurseries -----	Ornamentals	5	Mayesville
Out Post Nurseries of S. C.-----	Ornamentals	1/4	Charleston
Owen Brothers -----	Ornamentals	1 3/4	Aiken
Pacolet Mills Nursery -----	Ornamentals	3	Pacolet Mills
Palmetto Floral Nursery-----	Ornamentals	3 1/4	Charleston
Palmetto State Nursery -----	Ornamentals	8	Florence
Pecanola Nursery -----	Pecan	1/4	Cameron
Piedmont Nurseries -----	General	2	Gaffney
Pinehurst Nursery -----	Ornamentals	2	Summerville
Rawlinson, J. W.-----	Ornamentals	1/4	Rock Hill
Rembert, Mrs. R. E.-----	General	1/4	Rembert
Rock Hill Nursery -----	General	8	Rock Hill
Rosewood Greenhouses -----	Ornamentals	1/4	Columbia
Salter, T. P.-----	Pecan	1/2	Trenton
Santee River Nursery-----	Ornamentals	2	Lanes
Senn, Mrs. L. E.-----	Perennials	1/20	Mayo
Shannon Farm Nursery-----	Ornamentals	1	Jefferson
Simon's Nursery Co., Inc.-----	Ornamentals	3	John's Island
Skinner's Nursery -----	Ornamentals	1	Charleston
Smith, F. M. -----	Strawberry	1/4	North
Georgia-Carolina Nursery -----	Ornamentals	1	Trenton
Stateburg Forest Nursery-----	Forest	1	Sumter
State Forest Tree Nursery-----	Forest	2	Camden
Summerville Floral Nursery-----	Ornamentals	3	Summerville
Talley's -----	General	1/4	Florence
Taylor's Nursery -----	General	10	Greer
Three Trees Flower Farm-----	General	1/2	James Island
Tuck, Mrs. Oscar-----	Achemine	1/10	Westminster
Twixthoro Nursery -----	Ornamentals	3 1/4	Darlington
Utopia Nursery -----	Ornamentals	6	Greenwood
Wannamaker, J. E., Jr.-----	Pecan	5	St. Matthews
Watson's Pecanwood Nursery-----	Pecan	15	Orangeburg
Witherspoon, Miss P. F.-----	Ornamentals	1/20	Spartanburg
Wolfe, Russell S. -----	Ornamentals	4	Orangeburg
Wyly, O. S.-----	Cedrus Deodara	1/10	Walhalla

INTER-STATE NURSERY REGULATIONS

The inter-state nursery regulations govern the shipment of nursery stock into the state. In order to protect the South Carolina purchasers of nursery stock against receiving diseased plants from other states, it is required of all out-of-state nurseries to file with this office a duplicate inspection certificate issued by the official inspector of the state of ori-

gin stating that the plants have been inspected and are believed to be free from injurious plant pests. It is necessary that a very strict account be kept of these nurseries because some of them are located in or near infestations of insects or diseases that are not known to occur in this state.

After these certificates have been properly filed it is then required of nurseries in other states to purchase South Carolina permit tags, one of which must accompany each shipment coming into this state. They are, at the end of the season, required to account for the use of every one of these tags. For inter-state shipments last season there were issued 22,397 permit tags, 5,000 more than issued the previous year. These tags were issued to 212 nurserymen, located throughout the United States. After the above requirements have been fully complied with, free movement of plants is then allowed into and throughout the state.

In addition to the requirements stated above, each nurseryman is required to file with this office a duplicate invoice of the stock shipped to South Carolina. The invoice gives the name and address of the consignor and consignee, the kinds of plants shipped and the number of the South Carolina tag used. The purpose of these invoices is to enable the Commission to locate immediately nursery stock shipped from any particular nursery should an injurious insect or plant disease be found in that nursery after the regular inspection and certification has been made. This offers the further protection to our people in that immediate steps for proper control can then be taken.

REGISTRATION OF NURSERY DEALERS

The law requires that each dealer in nursery stock execute and file in this office an affidavit giving the names and addresses of the nurseries from whom he expects to receive shipments. This is done in order that these dealers may buy only from qualified nurseries that have received the proper inspections. If this stock is to be heeled in and kept for any length of time after reaching South Carolina, all such points are inspected in order that the stock may not become contaminated after leaving the original nursery. The greater part of the nursery stock received in South Carolina is purchased through catalogs, and not through agents or dealers. Citizens of this state purchasing nursery stock through agents or dealers should require them to show the proper credentials in order that they may be sure the stock they are buying is from reputable concerns. In the old days many misrepresentations were made regarding fruit trees, the purchaser in many cases not knowing this until years later when the trees came into bearing.

GREENHOUSE INSPECTIONS

The annual greenhouse inspections were made during November and December. The plants in 37 houses, with an area of approximately 530,000 square feet under glass, were examined and certified. The plants were found to be in good condition generally, through the common

pests such as mealy bugs, red spiders, aphids, rusts and leaf spots were in evidence. None of these, were causing any serious damage.

The Argentine ant infestations mentioned in last year's report as occurring in two greenhouses showed a marked decrease in the number of insects present and it is believed that with continued persistent efforts these infestations can be eliminated entirely. Following is a list of the greenhouses inspected:

Name	Address
Anderson Floral Company -----	Anderson
Blackman Greenhouse -----	Darlington
Bush's Greenhouses -----	North Augusta
Camden Floral Company -----	Camden
Carolina Floral Company -----	Charleston
Carolina Garden -----	North Augusta
Clinton Flower Shop -----	Clinton
Darlington Greenhouse -----	Darlington
Dodd's Flower Shop -----	Greenville
Eastside Greenhouse -----	Clinton
Eauclaire Greenhouses -----	Columbia
Eison, Inc. -----	Columbia
Fant's Greenhouses -----	Anderson
Floral Hill Gardens -----	Mt. Pleasant
Gaffney Greenhouses -----	Gaffney
Glen Ayers Floral Company -----	Spartanburg
Gilliam, Henry -----	Abbeville
Harling, O. L. -----	Greenwood
Hite Floral Company -----	Aiken
Hollywood Greenhouses -----	McColl
Laurens Floral Company -----	Laurens
Magnolia Floral Company -----	Charleston
Marion Floral Gardens -----	Marion
Moss, Chas. A. -----	Spartanburg
Palmetto Greenhouses -----	Florence
Palmetto Floral Company -----	Charleston
Palmer, Lee & Harvin -----	Sumter
Raysor' Florist -----	Greenville
Reid Flower Shop -----	Rock Hill
Ridge Greenhouses, The -----	Leesville
Shandon Greenhouses -----	Greenville
Shandon Greenhouses -----	Columbia
Summerville Floral Nursery -----	Summerville
Talley's Flowership -----	Florence
Wales Garden Greenhouses -----	Columbia
Wessel's Florist -----	Aiken
Weinold, Floral Company -----	Greenville

PARCEL INSPECTIONS

These are inspections made each year in addition to the regular nursery inspections, for parties wishing to send plant material to relatives or friends in this and other states. Growers of such plants do not have sufficient quantities to warrant field inspections, so it has been the custom in past years to have them send the plants to this office where they can be properly inspected and forwarded to destination.

For the sale of various cutting and flowering plants this office issued last season 15,000 of the small plant permit labels. These labels take the place of the express shipping tags and are also issued to such greenhouses outside of the state as make only parcel post shipments into South Carolina.

BULB INSPECTIONS

On account of Federal Quarantine 62 narcissus bulbs grown in South Carolina cannot be shipped into other states unless given two inspections, one while they are growing in the field, and another after the bulbs have been dug, cured, and ready for shipment. In these inspections special attention is given to bulb flies and a nematode *Anguillulina dipsaci* both of which are subject to the Federal Quarantine. None of these pests have yet been found in the commercial plantings of this state, though three species of nematodes, *Aphelenchoides parietinus*, *Aphelenchoides fragariae*, and *Aphalobus elongatus*, were found during the inspections this year. The nematode is especially difficult to control and every precaution is taken to prevent the plantings in the State from becoming infested. Diseases so far have played no important part in the production of this crop in South Carolina.

The field inspections were made during February when the bulbs growing on 530 acres were examined. The storage inspection was completed during August when 53,035,000 bulbs were examined. This is no small task because a large percentage of bulbs must necessarily be examined before we can be reasonably sure that none of the pests are present. The examination for nematodes, to be sure, is microscopic. There were issued to the growers of narcissus bulbs in South Carolina this year 10,000 federal permit tags.

The list of commercial growers is as follows:

Name	Address
Buckfield Plantation	Yemassee
W. A. Campbell	Sheldon
W. C. Geraty Company	Yonges Island
Joseph M. Harrison	Charleston
Russell S. Wolfe	Orangeburg
Carolina P. Cain	Pinopolis
Louis LeConte	Lykesland
Mrs. L. I. Guion	Lugoff
Chas. S. Mitchell	Seabrook

In addition to these commercial growers there have been many inspections made at this office for those wishing to ship small quantities to friends or relatives.

SWEET POTATO INSPECTIONS

During the past year appropriations for carrying on the work of the Crop Pest Commission were so drastically reduced that it was not possible to give the customary three inspections to the potatoes of those wishing to sell plants and seed as required under the law. It was, therefore, necessary to limit this service to only a very few who made special urgent requests. There are several destructive diseases of this crop occurring both in the field and in storage. It has been the aim of this Commission to aid the growers in producing disease-free plants and seed, thereby enabling them to put on the market potatoes of the highest quality, both for seed and for human consumption. There has been noted a vast improvement along this line during the years these regulations have been in force. We hope, therefore, that the appropriations in the future may be sufficient to carry on this important part of the regulatory service.

Growers in other states were required to comply with the South Carolina regulations, the same as in previous years. To them were issued 10,700 permit tags.

INSPECTION OF APIARIES

This work, as well as that of sweet potato inspections, was very much curtailed last season, for lack of funds to adequately perform the duties provided by the Act of March 15, 1922. We were able only to make inspections for those of our beekeepers who were breeders of queen bees. We were not able to give any aid in the eradication and control of American foul brood, one of the most serious of bee diseases and one which is not yet wide-spread in this state. The Commission has carried on the work the best it could with the funds at its disposal. During the year there were inspected and certified 800 colonies of bees. None of the injurious bee diseases was found in the apiaries of the queen breeders, though American foul brood was found in a few of the other apiaries inspected.

The regulations requiring other states to meet requirements similar to our own before shipments of bees, or used equipment can come into South Carolina have been enforced as in previous years.

During the season there were issued 300 queen certificates and 150 express permit tags for the shipment of package bees.

COTTON SEED REGULATIONS

The Commission, as in previous years, has required shippers into and within the state of cotton seed for planting purposes to file with this office an affidavit stating that the cotton from which the seed came was free from wilt and anthracnose. The growers have heartily complied with these regulations and there were issued to them last season 40,257 permit tags, one of which is required on each shipment.

CABBAGE AND TOMATO REGULATIONS

These regulations promulgated to prevent the spread of injurious diseases of cabbage and tomato have been enforced against other states but in this state last season funds were available for only a very limited amount of inspection work. About 50 acres of cabbage plants were certified. The severe cold spell in late January of this year killed practically all of the cabbage plants throughout the state. It was not possible to make any tomato plant inspections.

INSECTICIDE AND FUNGICIDE REGULATIONS

In order to regulate the sale of insecticides and fungicides within the state of South Carolina the General Assembly in April, 1922, passed as Act known as the Insecticide and Fungicide Act, under which it is required of companies selling such materials in the state to file with this office copies of the exact labels used on the containers. The Commission is required to see that the materials comply with certain specifications that are known to be correct for the purpose for which the insecticide or fungicide is to be used. In late years manufacturers have so improved their materials that the Commission rarely finds any that is not as recommended.

PHONY PEACH DISEASE

This disease is now known to occur in 12 southern states and in Illinois. It was first found in South Carolina during the summer of 1930, when preliminary scouting work was carried on by the Bureau of Plant Quarantine. During the summer of 1931 the Bureau of Plant Industry and the Bureau of Plant Quarantine in cooperation with the South Carolina State Crop Pest Commission inspected commercial orchards in 36 counties having a total of 649,975 trees. Forty-three infected trees found during these inspections were promptly destroyed.

For the past year we have been able to inspect only a mile radius around the nurseries growing peach stock for sale, which is a requirement before peach stock from these nurseries can be disposed of. Five such nurseries were inspected in South Carolina, each peach tree within this mile radius having been examined. Nine infected trees were found around four of these nurseries. If a tree is found infected within this mile radius it then becomes necessary to inspect each individual peach tree in the nursery at digging time. This will be done and all trees showing signs of injury by the peach tree borer will be discarded.

Phony peach is a virus disease, very destructive in peach orchards, and evidently not abundant in South Carolina. We believe, as stated in last year's report, that eradication should be resumed as soon as possible.

The regulations of this Commission prohibit the shipment into South Carolina of all stock budded or grafted on peach or nectarine roots unless properly certified.

JAPANESE BEETLE

The Japanese beetle, which was first discovered in this country at Riverton, New Jersey in 1916, has not, except in one instance, been found to have become established in an area widely separated from the original infestation. A few specimens, however, during the past few years have been trapped as far south as South Carolina and west in Missouri.

On July 12 of this year there was received a letter from one of our nurserymen stating that there was being enclosed two insects that he feared were unwelcomed visitors. Upon examination these proved to be Japanese beetles, that he had collected from some azalea plants growing in his backyard. Some concern was felt at this time that an infestation might have become established, because it is not usual for a layman to pick them up so easily. Immediate contact by this Commission, was made with the Bureau of Plant Quarantine and they very kindly at once, sent down 204 of the Japanese beetle traps to be placed around this and another location where one specimen was found in 1933. An attendant was sent to look after these traps which remained in operation for a month during the period of flight. No further infestations were found. This Commission assisted in the placing and removal of these traps.

The Japanese beetle is capable of serious damage to a wide variety of host plants and we believe every effort should be used to keep it out of South Carolina as long as possible.

No systematic trapping in South Carolina by the Bureau of Entomology of the U. S. Department of Agriculture was done this season due to a reduction in funds of that Bureau.

EUROPEAN CORN BORER

It is not known at this time what the exact status is of the European corn borer, a destructive insect pest of corn. The Federal appropriations for this work have been practically eliminated. This Commission in an endeavor to prevent the introduction of this pest into South Carolina has regulations prohibiting the shipment into this state of all plant products known to be hosts unless processed in such a manner as to make their entry safe or unless they have been inspected by a state or federal inspector and found to be free of the pest.

PINK BOLL WORM

This insect occurs in the United States in southern Mexico, western Texas, and southeastern Arizona. In last year's report there was mentioned a light infestation of this insect in north central Florida and in southern Georgia. No additional specimens have been found in the old infested districts of Georgia and Florida. During this fall, however, specimens of the insect were found in gin trash from a gin at Live Oak, Florida and at Bascom, Florida. Live Oak is in a county adjoining the old regulated areas in that state. Bascom is farther west near the Alabama, Georgia boundary. Two additional counties, in Florida, therefore, have recently been added to the regulated area inspection work and eradication of wild cotton is still in progress in these states.

No scouting work is being done in South Carolina this season. A very extensive examination by means of a gin trash machine was carried on by the Bureau of Plant Quarantine of the U. S. Department of Agriculture in cooperation with the South Carolina State Crop Pest Commission. Examinations were made throughout the coastal section of this state, because it was believed that if the insect had gained entrance into this state it would have been along its southern border.

The pink boll worm is a serious pest of cotton in other parts of the world, but aside from these light infestations which are being made a subject of an eradication campaign, it is not known to occur in the main cotton belt of the United States east of the extreme western part of Texas.

COTTONY CUSHION SCALE

Last November there was called to our attention an insect infesting various ornamentals on the campus of the University of South Carolina and vicinity. Upon investigation this was found to be a scale insect known as the cottony cushion of fluted scale. It is not new to this state, having been reported previously from Bamberg, Mayesville, Holly Hill, Hartsville, Charleston, and Aiken. At the time the investigation was made it was found that the infestation was not heavy except on a mimosa tree on Pickens Street. This tree was cut and burned the day the investigation was made. It was decided that due to the difficulty in controlling the pest with insecticides that control operations would be postponed until early spring, at which time an attempt would be made to establish one or more colonies of the Vedalia or Australian ladybird beetle, a predacious enemy which has proven so successful in the citrus groves of California and Florida.

In April, 1934, we obtained from Florida two colonies consisting of ten beetles each, and colonized them on the most heavily infested plant that could be found. This was a pittesporum plant on the campus of the University. Some difficulty was experienced in finding a plant sufficiently heavily infested to support the colony until young could be reared. An examination in July revealed the fact that this colony of beetles had apparently become established. It is hoped that they will survive the winter and next spring build up sufficiently strong to keep the scale under control.

While it may not be possible always to keep out of South Carolina certain insect pests and plant diseases, we feel that the longer this can be delayed the better it is for all concerned. A pest may not be serious in one section of a country but when transplanted to another section under different environmental conditions may become one of major importance.

We feel, therefore, that the money spent and the efforts put forth by this Commission in its endeavor to prevent the introduction into and spread within the state of injurious insect pests and plant diseases is well worth while

REPORT OF THE EXPERIMENT STATIONS

Dr. E. W. Sikes, President
The Clemson Agricultural College
Clemson College, South Carolina

Dear Dr. Sikes:

There is submitted below a summary of the 47th annual report of the South Carolina Agricultural Experiment Station.

Scientific research in agriculture was authorized, as a public function, by state and federal statute in 1887 and the experiment stations set up under these acts have functioned effectively since that time as the fact-finding and fact-interpreting agencies for the improvement of our agriculture. The results of researches already completed, and which during normal times serve as a basis for teaching, extension work, and improved farm practices and a more satisfying rural life, are serving now as the basis for regional and national planning for a rapidly changing agriculture and new social order.

The past year has been different from any year that preceded it. Much of the time of the scientists on our staff has been consumed in acting as technical advisors to those responsible for administering federal and state "New Deal" activities. This was of course as it should be, for in this way the greatest good could be accomplished. In some cases our department heads have been in active charge of important relief projects. Through this close cooperation with the state and federal relief administrations much information has been assembled which will be of permanent value to the agriculture of the state.

The Land Uses Survey conducted by the state and federal relief administration in cooperation with the research division of this institution involves a survey of every farm in the state and is yielding basic information on soil type, soil composition, productivity, cropping practices, topography, land use, farm organization, and on economic and social factors which will be of great permanent value to our rural people. Reports are being sent by the experiment station to each farmer in the state giving him the results of the study made of his farm and making recommendation as to land use, cropping plans, and fertilizer practices.

The Farm Real Estate Tax Delinquency, Farm Mortgage and Land Price study conducted jointly with the federal and state relief administration has furnished detail and accurate information on those subjects that could not have been secured in any other way. A preliminary report already published as an experiment station bulletin gives some of the information on tax delinquency.

Members of the staff also aided with the mosquito eradication projects and in an advisory capacity with the Soil Erosion Control project and are taking an active part in the land-planning and farm rehabilitation programs. Mr. G. H. Aull, assistant director of the experiment

station and head of our Department of Agricultural Economics, has been loaned to the federal government to head up the land-planning activities in this state.

In spite of the time consumed in these extra activities, the station staff has labored diligently to keep the long-time fundamental research projects going and has initiated new lines of research designed to answer perplexing questions arising in connection with our rapidly changing agriculture. If some of these new problems are to be solved promptly and definitely it will be necessary that the state, as its finances improve, increase the funds and facilities for this important and necessary work.

The report which follows gives a very brief summary of the more important activities engaged in during the year. A more detailed account of the research work will be made available as required by law, in a separate volume and copies of this may be had by writing to the agricultural editor or the director.

For convenience and clearness this summary report is classified according to subject-matter divisions.

Respectfully submitted,
H. W. BARRE,
Dean and Director.

AGRICULTURAL ECONOMICS

The Department of Agricultural Economics, with which is combined Rural Sociology, has a number of timely and important investigations under way. Reports on some of these have been published in bulletin form and placed in circulation during the year.

Farm Taxes

A series of investigations is being carried on in the field of taxation. It is generally recognized that our tax system is in a state of disequilibrium, and needs to be carefully revised in keeping with modern ideas and the tax-paying ability of the people. Especially has the burden of taxation fallen with unequal and disproportionate force on the shoulders of the farmer. Unequal on account of lack of balance between assessed and actual value of farm real estate, and disproportionate on account of the general property tax which falls so heavily upon the farmer, as a result of the nature of his business, and is levied without regard to the fundamental principle of ability to pay.

Three bulletins have been issued recently by the Station in the field of taxation: Taxation of Farmers in South Carolina, Taxation and Ability to Pay in South Carolina, and Farm Real Estate Tax Delinquency in South Carolina. These bulletins present data impartially obtained and critically analyzed, so as to furnish a sound basis for evaluating, appraising and improving our tax system.

In a study of 1586 individual income tax returns for the year 1932 it was revealed that only 466, or 29.4 per cent, were required to pay,

while 1120, or 70.6 per cent, escaped the payment of income tax. In other words, nearly three-fourths of the income tax returns for 1932 were handled at a total loss to the state.

The average of all taxes paid by individuals who filed returns for 1932 was \$134.10 as compared with \$145.68 in 1930 and \$174.86 in 1929. Income taxes required less than one-third of one per cent of the net incomes of those who filed returns, while other taxes required more than seven per cent. It hardly seems reasonable that taxes based upon possession should have yielded nearly 25 times more revenue than did taxes based upon ability to pay; but this was true in the case of approximately 16,000 individuals who filed income tax returns in 1932.

Another study reveals vast inequalities between groups of property holders. Almost without exception it is found that small farms will bear assessments which are relatively two to four times greater than corresponding assessments on large farms. In one county, for example, the average ratio of assessed value to sales value was 44 per cent on farms which sold for less than \$2,000, 32 per cent on farms which sold between \$5,000 and \$10,000, and 17 per cent on farms selling for more than \$10,000.

Tax delinquency has come to be an important problem in the state. The number of farm properties on which taxes were allowed to become delinquent increased 18 per cent between 1928 and 1929, 44 per cent between 1928 and 1930, 82 per cent between 1928 and 1931, and more than 100 per cent between 1928 and 1932. The average size of farm on which taxes are delinquent is appreciably less than the average of all farms.

Over a period of five years, 1928-1932 inclusive, approximately 30 per cent of the farm real estate taxes levied in the 46 South Carolina counties was allowed to become delinquent, and less than half this amount had been paid up to January, 1934.

Social and Economic Study of Representative Areas of South Carolina

This year considerable impetus in agricultural economics has been received as a result of the cooperation of the Civil Works Administration and Federal Emergency Relief Administration, Malcolm J. Miller, Administrator. These agencies have made possible a survey of around 2,000 farms in the counties of Greenville, Spartanburg, Saluda, Darlington, Williamsburg, Hampton, Charleston, and Chester. This constitutes a five per cent sample of the white and negro farmers in these counties. The data, which have been collected and are now being analyzed by the experiment station staff, represent complete information along certain sociological and economic lines.

The sociological investigations involve various types of movements made by farmers and their families, such as changes in residence, in occupation, and in tenure status over the period of their entire employed life. These factors will be related to various other factors, such as education, size of family, size of farm, annual family income, and participa-

tion in community and other organizations. Preliminary analyses of the information obtained indicate that interesting results will be forthcoming.

In a period of rapid change and uncertainty, such as accompany periodic social and economic fluctuations, it is necessary to take stock of the factors associated therewith, especially those that involve the financial welfare and thereby affect the living standards of the people. Fortunately such information is being obtained in this economic-social survey.

Of strategic importance in this investigation will be the analysis of the farm business and the cost of production of commodities produced by the 2,000 farmers. In this connection the primary object is to determine the more profitable systems of farm organization, according to type of farming areas, and to relate the various factors to income.

One of the most significant aspects of this social-economic survey is that a vast amount of data has been collected simultaneously along sociological and economic lines within a comparatively short period of time. This makes it possible to compare data on different farms in the same area and to compare the different areas of the state. This feature has great value in this type of research, and the opportunity has not been afforded in the past to make such comparisons.

Mobility Among Farmers

A bulletin was issued in June, based on data collected in 1931 among 300 white farmers in Pickens county, in which was analyzed various movements made by these farmers. It was shown that those farmers who had moved the most had accumulated the least and had contributed the least to their respective communities. On the other hand, those farmers who had achieved success were found to have moved little. The old saying that "a rolling stone gathers no moss" was corroborated by the findings of this study. In the larger study of the 2,000 farms, referred to above, a more rigid examination is being made of the relation between moving of farmers and their social and economic well-being.

Cotton Marketing Study

The station has cooperated with the Division of Cotton Marketing of the United State Department of Agriculture in investigations of the grade and staple of cotton produced in the state. In this way the cotton producer and the cotton trade are informed, through news letters and otherwise, of the extent to which consumption demand is being met by local production. This information is essential in planning for logical cotton production in the future.

From five to 10 per cent of the ginnings in the major cotton-producing sections of the state, samples of cotton are collected and classed by

expert government classers. The data so collected are used in estimating on a percentage basis the quality of the total cotton crop of the state.

The records for 1933 indicate a decrease in the average length of staple of cotton in South Carolina. No doubt this was due to the cumulative influences of the depression, which prevented farmers from maintaining established quality and purity of planting seed, and also to the discontinuance of the cotton contest of the Extension Service. On the whole, however, the staple length of the state's cotton crop has shown marked improvement. The production of cotton with staple lengths of 15/16 inch and longer increased from slightly more than one-third of the crop in 1928 to approximately three-fourths of the crop in 1932.

Truck Crop Production Efficiency

Results growing out of a study of truck crops in the newer truck crop area of South Carolina are in the later staples of analysis and will be published by the station at an early date. The study will present findings such as (1) the more profitable farm organization set-ups, (2) factors affecting income, and (3) analysis of inputs, costs, and returns on commercial truck crops. The high rank of the aggregate value of truck crops, which is third among the commercial crops of South Carolina, emphasizes the importance of a study involving efficiency and organization of truck crop production.

Farm Land Prices and Mortgage Indebtedness

An investigation of farm land prices and mortgage indebtedness is now under way by the station, made in cooperation with the Federal Civil Works Administration and the State Emergency Relief Administration. Land prices and trends over a period of years are being analyzed; a land price index by townships and counties will be worked out; and data collected will be used in connection with studies in land utilization, taxation, and other fields.

The importance of community cotton production, in which the one-variety idea is practiced, has been stressed time and again. A study dealing with the effects of such a practice is now under way, and the report is in process of preparation.

There are other lines of research under way in this field but these examples will serve to show that the South Carolina Experiment Station is making a serious effort to secure the basic economic data upon which a changed economic and social order must rest. The program is flexible enough to take care of changes which occur and yet rigid enough to meet the needs that are more or less of a permanent character.

ANIMAL HUSBANDRY

Because of the necessary reduction in the acreage of cotton and tobacco there are many acres in South Carolina which can be devoted to improving our livestock practices and profits. The Animal Husbandry

Department is studying pasture, feeding, breeding, and land-use problems designed to make beef cattle, hog, and sheep raising in South Carolina more profitable and to fit livestock production more definitely in to our agricultural program.

Each animal in the college herds serves the following purposes:

1. To train the students in the arts of feeding and judging livestock.
2. To secure experimental records which will lead to more economical methods of production.
3. To demonstrate to South Carolina farmers the best known methods of feeding, breeding, and management of livestock.

Reducing the Cost of Wintering Purebred Hereford Cows by the Use of Reserved Permanent Pasture

The cost of carrying beef cattle through the winter is one of our most important problems. Breeding cows and young stock especially must come through the winter in good condition if satisfactory results are to be secured. During the past winter an experiment was made with our breeding herd. The results were very interesting and are quoted below:

Sixteen cows were divided into two lots of eight cows each. One lot received an average daily ration of 20 pounds of silage, two pounds of cottonseed meal, and five pounds of grass hay; and the other lot received an average daily ration of 2.87 pounds of cottonseed meal and had the run of a permanent pasture which had not been grazed the latter part of the summer.

The total feed cost per head was \$14.01 in Lot 1, and \$3.17 in Lot II. The permanent pasture therefore had a feed-saving value of \$12.88 per acre.

Production of Early Spring Lambs

Sheep raising is rapidly becoming one of our most important livestock enterprises. To make sheep raising most profitable we must develop methods of breeding and feeding that will enable us to put our lambs on the market ahead of the large sheep-producing sections in the West.

The object of the experiment conducted by the department, therefore, is to improve the inherent capacity of sheep for early spring lamb production and develop practices which will bring this about. This should lead to the profitable production of both meat and wool.

In this study production records are being obtained from purebred flocks of Hampshire, Southdown, Tunis, and Corriedale sheep. Production records are also secured from Hampshire-Tunis crosses, Southdown-Tunis crosses, and the reciprocal crosses of these breeds. Results already secured are very promising.

Summer Forages for Fattening Hogs

For several years this department has been making experiments to determine the value of different forage crops in fattening hogs. Soybeans

gave excellent results in some of the earlier tests and the results with this crop have been published. More recently we have compared soybeans with other forages.

Last year 50 spring pigs were divided into six lots. Each lot was fed corn and fishmeal free-choice while grazing on forage. The forages used were green soybeans, millet, and Sudan grass.

The hogs on forage made faster and cheaper gains than those in dry lot. Green soybeans produced the most economical gains.

At the close of the feeding test the hogs were killed and the carcasses graded for hardness of fat. Over 95 per cent of the carcasses were satisfactory.

A Comparison of Green Rye and Barley as Winter Forages for Fattening Hogs

Previous experiments have shown that most economical pork production requires some kind of green forage during the winter. Last year 20 hogs were divided into two lots and fed corn and fishmeal free-choice while grazing on green rye and on green barley. The hogs on barley made the faster and cheaper gains.

The lots on which these hogs grazed were cut for grain and the seed yield compared with adjoining lots that were not grazed. The grazed barley lot yielded 99.79 per cent as much grain as the ungrazed lot. The grazed rye lot yielded 70.25 per cent as much grain as the ungrazed lot.

A Comparison of Methods of Feeding Cottonseed Meal and Hulls to Fattening Steers

There is no general agreement among cattle feeders as to the safest and most economical way of feeding steers that are being fattened on cottonseed meal and hulls.

This preliminary test was conducted to determine (1) the best amounts of meal to use at the start of the feeding and (2) the rate at which this meal should be increased. Twelve good grade steers were fed individually.

The amount of cottonseed meal used at the start of the test ranged from one to four pounds per steer. The weekly increase of meal ranged from one-half to two pounds per steer.

The results of this test indicate that the economy of gain may be affected more by the rate of increase of meal than by the amount used at the start of the test.

This test is being repeated with a larger number of cattle.

The Berkshire Show Herd of Swine

Last fall Clemson's Berkshire herd showed at the National Swine Show and the state fairs of Ohio, Indiana, Kentucky, North Carolina, and South Carolina. The herd won 57 first prizes out of a possible 84, and 20 championships out of a possible 36.

The Berkshire herd is on the show circuit this fall and to date has made even a better record than last year. The show record of Clemson's Berkshires has never been equalled by any other agricultural college in

the United States. It is doubtful if any swine breeder in this country has produced a herd which has won so consistently over such a long period of years.

PLANT PHYSIOLOGY AND PLANT DISEASES

Arsenic Toxicity in Soils

Heavy applications of calcium arsenate dust for the control of the cotton boll weevil occasionally produce arsenic toxicity to succeeding crops on some sandy soils of the state. Studies were made on the capacity of soils to render arsenic non-soluble and the effects of certain fertilizer constituents on increasing its solubility in the soil.

In a 2-to-1 mixture of precipitated ferric hydroxide and ferric arsenate respectively, there was practically no soluble arsenic, but upon addition of the mixture to the soil appreciable amounts of soluble arsenic were found, suggesting that salts in the soil exerted a solubility effect upon the relatively insoluble ferric arsenate.

Varying amounts of fertilizer constituents such as potassium chloride, potassium nitrate, potassium hydrogen phosphate, and tricalcium phosphate were added to soils containing arsenic. The two phosphorus-containing compounds increased arsenic solubility in the soil while the others did not. The phosphate ion seems to be important in increasing arsenic solubility. This agrees with field observations that arsenic toxicity is most pronounced on fields heavily fertilized with superphosphate.

The Effects of Certain Mineral Nutrients on the Growth and Fruiting of Cotton

In preliminary experiments, boll and leaf shedding of cotton in nutrient solutions with varying amounts of magnesium were noted. Further studies with aerated cultures in the greenhouse have been made in which the supposedly normal and four times the normal amount of magnesium were used. Complete data are not yet available but observations of the plants showed greater top and root growth, longer fibrous and relatively unbranched roots, delayed fruiting but finally twice as many bolls on plants in the high magnesium solution as those growing in the low magnesium solution.

Observations of the deficiency of this mineral in some soils and the effects on crops are being made. Abnormalities of various crops presumably due to a manganese deficiency are being called to our attention by farmers in the Coastal Plains and the trouble is either becoming more prevalent or is more widespread than was supposed.

Variation in Cotton Fiber Length and Distribution in Several Varieties

A rather wide variation in the length and distribution of fibers from bolls of a plant have been found in one variety with which we have been working. To see if other varieties might show this wide variation, 18 varieties have been studied for two seasons, though the results from only one season are available. Varieties with long, short, and intermediate

staple lengths were selected. Boll collections were made at two periods from all varieties. Usually the long cottons are somewhat more variable than the very short ones, but in the first collection of bolls the variety Wilds Strain 5, with the longest staple, ranked at the top with the shortest stapled variety, Improved King. In the second collection of bolls, Wilds Strain 5 was almost as uniform as Wannamaker's Cleveland, a distinctly shorter stapled variety than was perhaps the most uniform. Using the weight of 1000 one-inch fibers as a measure of fineness, Wilds Strain 5 ranked second in this regard at one collection and seventh at the other.

Seedling Diseases of Cotton

The difficulty of securing a stand of cotton during some years is well known to growers who generally ascribe the trouble to weather conditions. The damp cool weather, when the trouble occurs, seems favorable for organisms which attack the plant and unfavorable for the growth of cotton. This combination of conditions occurred this spring, resulting in rather serious losses of cotton seedlings in many fields in the state.

An anthracnose fungus was found on most of the diseased seedlings which were examined. Several lots of seed used in planting also carried the fungus. A survey of the same fields in September showed some of the boll-rot caused by anthracnose but no very serious damage except in one field in Orangeburg county. As a result of the work of Dean H. W. Barre several years ago, losses from anthracnose boll-rot have been greatly reduced and this disease was no longer considered an important factor in cotton growing. It was, therefore, a great surprise to find the organism so widespread in the state. The campaign for anthracnose-free seed may have to be revived if such damage occurs again.

Further cooperative work with the U. S. Department of Agriculture has shown that several soil-inhabiting nematodes go into cotton seedlings but at favorable temperatures for cotton growth they seldom kill the plant. The punctures they make serve as easy points of entrance for parasitic fungi, and the two classes of organisms together are quite destructive.

Most of the lots of cotton seed used in our tests this year showed internal infection with fungi and gave poor germination and consequently poor stands in the field. Rainfall and high humidity at the time of cotton picking seem to induce high incidences of this trouble. If seed with a moisture content above 14 per cent are stored, serious damage is likely to occur in a short time. Storage tests with seed of lower moisture content are being conducted to see if greater vitality and freedom from fungus infection can be obtained.

Downy Mildew or Blue Mold of Tobacco

Downy mildew of tobacco made its appearance in the tobacco-growing section of South Carolina last spring too late to cause much loss. However, when it did appear, its attack was wide-spread and severe, causing

great damage to plants remaining in seed beds. Fortunately, most growers were able to set their plants in the field before the general outbreak of this disease occurred.

Parallel experiments conducted at Florence and Clemson College indicate that high temperatures (minimum 92°—93°F) will protect seedlings from the disease although not keeping out infection entirely. All known methods of obtaining this constant high temperature, however, are too expensive and require too much care to be practical, and, furthermore, this constant high temperature seems to lower the quality of the seedlings.

Spraying experiments, using Cal-Mo-Sul as spray material, indicate that proper use of this spray may so reduce the incidence of disease as to be of value to the grower. These experiments are being repeated this fall.

The temperature range at which infection and sporulation can occur is from 12°-14°C to 24°-26°C.

Experiments have shown that sporulation can occur at a relative humidity slightly below saturation, at which point visible moisture is not formed on the leaves.

All attempts to germinate oospores, the overwintering spores, of this fungus have so far failed. Several chemicals and extreme variations in temperature have all been tried in an effort to break a possible "rest period", but so far no success has been obtained.

Plant Disease Survey

The Plant Disease Survey has been conducted as usual. No particularly severe outbreaks of any disease were noted over a wide area though tobacco downy mildew, peach bacterial spot, cotton wilt, a bacterial wilt of tomato, and pecan scab were quite destructive in some areas.

RESEARCH WORK IN CHEMISTRY

During the past year this department has received 870 samples of various kinds. These were collected to study the chemical problems involved in the various projects in which this department is interested.

The analysis of these samples has involved many thousand determinations. In addition to the more common mineral elements such as iron, aluminum, calcium, magnesium and phosphorus, some of the more uncommon ones such as iodine, copper, manganese, sulphur and chlorine were determined. Also many organic determinations have been made, such as fats, oils, sugars, starches, gossypol, protein, etc.

About 250 soil samples have been collected from various sections of the state to be used in a study of the factors influencing the iodine content of plants. These samples represent different soil types and horizons. This work is in progress.

Several mineral balance or feeding experiments with cows have been carried out in cooperation with the Dairy Department.

In connection with the Agronomy Department much work has been done in mineral deficiency in plants, especially pasture grasses grown in the lower part of the state.

In cooperation with the Horticultural Department we are carrying on the chemical work in the project involving the factors affecting the composition of asparagus crowns.

A study of the mineral and organic constituents of vegetables was continued during the year.

DAIRY DEPARTMENT

Much of the research along dairy lines continues to be directed toward working out the most acceptable forms and sources of roughages for dairy cattle feed.

Pasture Experiments

It has been found that by the simple and inexpensive treatment of soils with the application of a ton of ground dolomitic limestone rock per acre once in eight to 10 years and the application of 200 to 400 pounds of 16 per cent superphosphate per acre annually, returns from grazing milking cows are secured during the grazing season of seven months, from April to October, which have feeding values comparable to 3.5 to 4.6 tons of alfalfa hay per acre. When you apply the value of alfalfa hay either at its cost for raising or its purchase price to these yields, it is evident that Bermuda pastures when properly improved offer an excellent source of feed for dairy cattle in a very cheap form.

Comparison of Silage with Dry Roughages

It is very difficult to cure hays in this climate on account of the frequent rains during the harvest season. The roughage crops grown for winter feeding may, however, be saved by storing in the silo. A test made during the winter of 1933-34, in which corn silage was the only roughage used and cottonseed meal the only concentrate fed, proved that for a winter feeding period of 112 days this combination was entirely satisfactory from the standpoint of the health of the cows and the economic production of milk. Along with this silage test a similar test was conducted using ground corn fodder as the only roughage and cottonseed meal as the only concentrate. This preliminary test with corn fodder showed a very low return from this feed when used as the only roughage for a winter feeding period of as much as 112 days. The corn fodder returns were 35.3 pounds of total digestible nutrients per 100 pounds of dry matter fed in corn fodder, while on the silage ration the return of 54.3 pounds of total digestible nutrients was secured for every 100 pounds of dry matter fed in the form of silage. Although these results represent only one winter feeding period, preliminary deductions may be made to the effect that corn fodder is not to be recommended as the only rough-

age for milking cows for a complete winter feeding period while corn silage may be very satisfactorily used as the only roughage when cottonseed meal is the only concentrate fed.

Calcium and phosphorus balances were made on both of the above rations. These balances showed both rations to be in positive balance for calcium. The corn fodder ration was in positive balance for phosphorus while the corn silage ration was in practical equilibrium for phosphorus. When 195 grams of steamed bone meal were fed daily with each ration both the calcium and phosphorus balances were improved for each ration. These data indicate, to a certain extent, that when corn silage is fed as the only roughage and cottonseed meal as the only concentrate, supplementary feeding of steamed bone meal is advisable.

During the 1933 growing season small areas of grass on both a creek bottom carpet grass pasture and an upland Bermuda grass pasture were protected by wire cages. These areas were clipped at regular intervals throughout the season and samples were analyzed to determine their feed analysis.

The most striking differences noted in the two grasses are the higher dry matter content and the higher per cent of protein in the dry matter of Bermuda grass and the consequent higher per cent of carbohydrate material in the carpet grass.

Through a study of 23,832 Register of Merit butterfat records on Jersey cows which have been published by the American Jersey Cattle Club, it is found that the number of milkings per day during the record is quite an important contributing factor to the size of the resulting record, the increase being directly proportional to the number of extra milkings during the record period. It is also found that the length of gestation up to 234 days has a very small effect on the resulting record. When records of 305 days in length are compared with records of 365 days in length it is found that on an average of all records the 365-day records are 120 per cent of the 305-day records. These findings indicate that in order to bring production records made in different classes to a comparable basis corrections should be made for the number of milkings and for the length of gestation as well as for age and length of the records, which has been the usual procedure by workers in this field.

ENTOMOLOGY

Features of the Year

Cotton boll weevil threatened all through the season and did more damage than usual in the western part of the state, but less damage than usual in the eastern part of the state, this being an unusual condition.

Damage to peaches by Oriental fruit moth was greater than last year and perhaps somewhat above the usual average; at same time the codling moth in apple orchards was not above its normal in early season, but the late (third) brood was apparently more destructive than usual.

Thrips did less than usual injury to cotton seedlings; injury by cotton flea hopper was generally not serious; damage to corn by billbugs was less than usual; Mexican bean beetle was about normally destructive during the year; while injury to tomatoes by fruit worms was apparently less than usual especially through the height of the fruiting season.

Asiatic beetle (taken in traps at Aiken in 1933) was not heard from in 1934.

Japanese beetle was again represented by the taking of two specimens by a citizen in Greenville, but prompt trapping operations failed to reveal others.

Findings in Work on Projects

Southern Corn Stalk Borer.—That early-planted corn is subject to much early-season infestation which may be escaped by later planting, was again proven by tests conducted at the branch stations at Summerville and Florence, and at Clemson College, as follows:

1. At Summerville corn planted 29 March was 40 per cent infested, while that planted 28 April was only four per cent infested.

2. At Florence corn planted 3 April was 17 per cent infested, while that planted 25 April was only two per cent infested.

3. At Clemson College corn planted 5 April was 32 per cent infested, while that planted 3 May was only six per cent infested.

Corn Billbugs.—Studies at Florence were continued, injury being less than usual. First damage was noted April 25. Injury was observed in several eastern counties, the height of 80 per cent stalks damaged being noted in Dillon and Florence counties. In plot plantings the corn which was planted earliest (April 3) was least damaged by billbugs, though at same time it is true that early planted corn is subject to more injury by the southern corn stalk borer previously discussed. Records were also made on egg-laying and other features of the life-history of the insects.

Corn Weevil.—Tests were made in the use of a number of substances to protect stored corn from damage by weevils. It is expected to publish the results in bulletin form within the next year or so.

Boll Weevil Hibernation.—Out of 3,000 weevils placed in hibernation cages at Clemson College in the autumn of 1933, 76 weevils (2.53 per cent) emerged in the spring of 1934, the first one emerging April 9 and the last on July 5,—the heaviest emergence being during May and early June.

Oriental Fruit Moth.—On young peach trees at Clemson College 25 to 100 per cent of the new-growth twigs were injured by the larvae of this insect. Of fruits up to and through the first part of August (including Elbertas) about 12 per cent were infested, while with the yet later varieties the damage increased to 23 per cent.

Other Fruit Insects.—Tests and observations were also made on codling moth, San Jose scale, and peach and plum curculio.

Thrips on Cotton and Other Plants.—The injury to cotton was less than for the last several years, and the same three species of thrips as observed in other years were chiefly responsible for such injury as occurred.

For the first time in our experience one of these cotton-infesting species (*Thrips tritici*) was responsible in the eastern part of the state for serious damage to lima beans, being apparently partly or entirely the cause of small undeveloped beans in full-sized pods—such being locally known as “naughts.” Onions were injured to some extent by another of the cotton-infesting thrips (*T. tabaci*).

Cotton Flea Hopper and Associated Insects.—During the years from 1925 to 1928 this insect did considerable damage in many parts of the state, but since 1928 its outbreaks have generally been local, usually of short duration, with the crop recuperating from the injury. During 1934 our studies were directed chiefly to ascertaining the seasonal increases or fluctuations in the population of this species and others in cotton fields. The flea hopper was present in greatest numbers from about the middle of August to middle of September (present writing) the high point having been reached about August 25. Three species of leaf-hoppers were present in considerable numbers.

Tomato Fruit Worm.—Tests for control of this insect have been continued along exactly the same lines as in previous years. Data covering several years at Clemson College indicate: (1) Less damage than we originally expected, (2) that infestation is heavier on the earliest fruits, less severe on the late-season fruits, and very light on fruits through the main picking season; and (3) that infestation of tomato fruits is much less and apparently quite secondary to the infestation of silks and ears of corn; i.e., if corn is in silk near by during the main blooming and fruiting season it seems to act as a protection to the tomatoes. The poison-treatments did not show as good results during 1934 as they have averaged in other years.

Mexican Bean Beetle.—The survival of beetles through last winter in our cages was less than usual (17.45 per cent). Search for hibernating colonies of the adult beetle were made but only one single hibernating adult was found. Tests were made with a number of non-arsenical materials for control of larvae and adults of the insect on growing bean plants, but conclusions are not yet warranted.

Several insects have been found feeding on various stages of the Mexican bean beetle.

As an additional step in the Mexican bean beetle project we this year conducted cage tests with various legumes to ascertain which ones were most relished by the insects. In general the garden or table varieties of beans were preferred, while of those tested peanuts, beggarweed and kudzu were least attacked.

Faunal Survey.—Although certain large groups of insects have not yet been much worked in our studies, it would seem that we do already

have on record a considerable proportion of the larger insects which are easily to be taken by general collection,—hence it is believed that much of the further progress will be by concentrating attention on certain definite groups and by employing specialized methods to find and collect them in various parts of the state. In our report of one year ago we reported that on October 21, 1933, we had 4,440 species of insects on record for the state; and it is now in order to report that since that time 216 species have been added to our card-catalogue list, so that at present writing September 24, 1934 we have 4,656 species on record as occurring within the state of South Carolina.

FIELD CROPS AND FERTILIZERS

The experimental work with field crops, soils, and fertilizers is conducted at Clemson College and at four substations. These experiments are planned to secure information which is of immediate value in the production of crops and in the economical utilization of the land resources of the state.

Variety Tests

The various varieties of common field crops are tested each year so as to determine the best ones for the various conditions found in the state.

Fertilizer Experiments

The fertilizer tests include comprehensive experiments on the kinds and amounts of fertilizer to use for important crops on various soils found in the state. The common sources of nitrogen, phosphorus, and potash are included in these tests.

Potash Deficiency

Cotton rust, due to a deficiency of available potash, is very common in the Coastal Plains section of the state this year. Potash deficiency seems to be most acute during dry years. The relatively dry growing season in some sections has undoubtedly accentuated the potash deficiency in various crops. Potash deficiency has become an important factor on much of the land used almost exclusively for the production of hay and grain crops. Where the land is used for the production of cotton in a short rotation and fertilized liberally with a complete fertilizer there is often sufficient potash and phosphorus available in the soil for the hay and grain crops following cotton. In many of the relatively level and naturally poorly drained areas cotton boll weevil damage may be serious and such land is being utilized almost exclusively for the production of grain and hay crops. Soybeans and cowpeas are the first of the grain and hay crops to show marked potash deficiency symptoms. Corn is one of the next common crops to show serious symptoms of potash deficiency. The oat crop is the last one of the general field crops to be seriously affected by a low supply of available potash in the soil.

The serious deficiency of potash observed this year suggests that it would be highly profitable for many farmers to increase the potash content of their fertilizers. Some of our soil will respond to a 50 to 100 pound application of muriate of potash in addition to the regular commercial fertilizer commonly used.

Soil Acidity

A state-wide soil acidity survey is being carried on in cooperation with the Federal Emergency Relief Administration. An attempt is being made to determine the soil acidity of the various soils found on every farm in the state. The results of these tests are reported to every farmer with liming and fertilizer recommendations for each field on the farm.

Since most of the soil in the state is too acid for the optimum growth of crops, it is highly desirable that most farmers use a non-acid forming fertilizer which contains dolomitic limestone rather than sand or other inert filler. Where the soils are more than slightly acid farmers should purchase a non-acid forming fertilizer for most of the important crops grown in the state.

Farmers are very much interested in the acidity condition in their soils and they are anxious to follow our recommendations. The intelligent use of lime on the soils will be of great economic benefit to the farmers of the state. The soil acidity survey is considered one of our most significant projects since it has such an important bearing on the economical utilization of our soils.

Nutrient Deficiencies

Nutrient deficiency symptoms in truck crops in the Charleston and Beaufort areas have not been nearly so serious this year as in certain previous seasons. Many of the truck farmers have followed our recommendations and have corrected much of the minor nutrient deficiency which exists in the production of truck crops.

The result of our studies with potatoes shows that manganese is very often a limiting factor in crop growth in the truck area around Charleston. Experiments show that an application of 100 pounds of manganese sulfate per acre has increased the yield of potatoes from 10 to 25 per cent.

Some of the truck growers are very enthusiastic over the results secured by following our liming and fertilization recommendations, and it will be necessary to follow up their practices very closely in order to prevent them from adding too much lime material to their soils. A number of farmers will undoubtedly injure some of their soil for certain crops by the addition of too much basic material.

RESEARCH IN HOME ECONOMICS

Expenditures for Farm Family Living

A report entitled, "A Study of the Expenditures for Family Living by 46 South Carolina Rural Families" has been written. The analysis and interpretation of the data had proceeded far enough last year for tentative findings to be submitted, but the subsequent more detailed analysis revealed certain other significant facts. The report is based on data secured from supervised accounts of family living expenses kept by 46 rural homekeepers for a period of one year. All but two of the families considered lived on and operated farms.

Interest in the facts which their account keeping disclosed has been shown by the account-keeping women. It is believed that it will induce more thoughtful use of the financial resources available for rural family living. Some of the women are continuing to keep records which are also being supervised by this department.

The report was published as Bulletin 299 by the experiment station in September, 1934.

Food Consumption of Farm Families

"An Economic Study of the Food Consumption of Farm Families in the South Carolina Piedmont", begun in 1932, is nearing completion. The study was planned to discover the content and money value of adequate farm family dietaries in the Piedmont section and to find some of the related economic factors. The project has seemed a timely one because of recently increased interest in planned agricultural production. An analysis has been made of the food quantities, the nutritive content, and the money value of 178 weekly food records for white families and 97 for negro families. A report on a small unit of the study was made at the annual meeting of the American Home Economics Association the last of June, and certain data have been prepared for use in a publication on food consumption studies by the Bureau of Home Economics, United States Department of Agriculture. A summary of certain aspects of the study will appear in the report of the experiment station for this year and a full report as a bulletin of the station during the fiscal year upon which we have recently entered.

The Attitude of High School Seniors to Farming and Farm Life

The findings in a study of "The Attitude of High School Seniors to Farming and Life on the Farm" were reported last year for the white race only. It was later decided to secure the reactions of negro high school students to the same questions. This has been done. An analysis and interpretation of the data for the two races will be published in the near future as a bulletin.

Activities undertaken in order to promote the use of the findings of home economics research have consumed a considerable portion of this fiscal year for one of the members of this department. Such efforts include responses to calls for assistance in interpreting and applying to local situations and conditions the information contained in our bulletins. Calls come for plans for club, community, family, and individual use and for addresses before organizations. Requests are received for articles for educational and club publications. Effort has been made to respond to all such calls.

A study of the milk supply available for farm families will be undertaken during the coming fiscal year.

HORTICULTURE

Apple Pollination and Sterility Studies

The Horticultural Department has found from studies previously reported that certain varieties of apples are self-sterile and that certain other varieties produce an abundance of pollen that will successfully pollinate their own flowers as well as those of many other varieties. Results secured last year continue to emphasize the fundamental importance of these studies.

Unusually adverse seasonal conditions during the pollination period caused the Delicious and many trees of other varieties to set a very light crop of fruit where effective pollen was not available, whereas limbs of the same trees which were pollinated with effective pollen set a very heavy yield of apples. The pollination tests verified previous results in that the Ben Davis, Gano, Early Harvest, Yates, Delicious were more effective pollen-bearing varieties. Records were taken of fruit set on the new Starking and Staymared varieties pollinated with the different varieties of pollen. Results indicate that the Starking is much like the Delicious, and the Staymared similar to the Stayman in pollination requirements and pollen potency. The apple seed studies, pollen longevity studies, and studies of the size variation of the pollen grains, as correlated with sterility, were continued with the same general results.

Bees have been found to be the most effective agent for disseminating pollen and necessary in variety orchards if a full crop is to be expected.

Fruitfulness of Fordhook Lima Beans

Weather factors have been found to be responsible in a large measure for the small yield of the Fordhook lima bean. Studies have continued to determine the relative influence of temperature and humidity on the physiological functions of the lima bean plant. Although the amount of rainfall was more favorable than usual, the Fordhook variety set a very light crop of beans in the experimental plots at Clemson College this season. The excessively high temperatures during the blossoming period was apparently the chief factor responsible for the light fruit crop. Pre-

liminary stomatal studies indicate that there is a considerable difference in number, size, and usual functional performance of the stomata of the Fordhook variety as compared with that of the heavier-setting Henderson variety. Much time during the past season was spent in histological preparation for the more detailed physiological and morphological aspects of the problem.

Fruit Varietal Studies

The fruit variety studies include several hundred different varieties of peaches, apples, grapes, and berries. Careful observations and tests of quality are made with all of these every year.

One of the most promising varieties of peaches in the experiment station orchards is the Gage. This variety produces large, yellow-fleshed, free-stone, highly-colored fruits which have ripened five to eight days later than the Elberta for the past three years. Some of the tree characters of this variety are very desirable. It has a more spreading habit of growth than most peach varieties and needs to be planted farther apart than has been the usual practice. This variety is very resistant to bacteriosis and partly for that reason, it should be of more value in the Sandhill section of this state than the Elberta. The foliage is also very resistant to arsenate of lead burning and consequently, less trouble is experienced, especially during seasons like the past one which was very favorable for this kind of injury. While this variety matures a few days later than the Elberta, it is not sufficiently late to cause larger losses by the Oriental fruit moth. The Gage is a good canning variety and has a better flavor than the Elberta.

Vegetable Varietal Studies

Sweet Corn.—There is a recognized need for good-quality, high-yielding, early varieties of table corn to be recommended to truck growers and home gardeners who still produce mostly later-maturing semi-sweet corn and field corn for table use. True sweet corn varieties seldom do well under our season conditions because of usual damage from drought, hot weather and corn ear worm. For this reason the early sweet corn varieties and a few of the later-maturing varieties are recommended. In view of this fact, more attention has been given to strain studies of the few desirable varieties of sweet corn and to the selection of semi-sweet corn varieties which seem to be more adapted to our seasonal conditions. A number of the more promising new varieties as well as standard varieties were grown in test plots during the past season. Some progress has been made in selection of varieties resistant to common ear worm. However, some breeding work seems necessary in order to develop early as well as late varieties of desirable table corn which may be recommended to growers in preference to varieties now grown. The new and noteworthy varieties tested the past season include the Honey June from Texas Experiment Station and Silver Beauty from Schell, both late varieties.

Miscellaneous Vegetable Variety Tests.—During the past six years the Horticultural Department has conducted on a less extensive scale vegetable variety tests of onion, cowpea, pepper, melons, beans, cabbage, and other vegetables. A new variety of cowpeas known as the Two Crop introduced by Mr. McIver Williamson of Darlington, S. C., seems to be outstanding for its yield, high quality, and upright growth of the vines. The Riverside Sweet Spanish Onion seems to be superior in yield and size to the standard varieties generally grown in South Carolina. No new varieties of beets, peppers, cucumbers, melons, spinach, turnips, sweet potatoes, Irish potatoes have been found to merit a change from the standard varieties.

POULTRY EXPERIMENTS

Poultry experiments have dealt chiefly with the practical problems of rations, housing, and management, as they particularly apply to poultry production in South Carolina.

Work on determining the simplest and most satisfactory rations for laying hens and chicks has been continued. Results indicate that the larger portion of the poultry ration might be produced on the farms of the state. Where green feed is available a simple laying mash gives as good results as a more complex and more expensive formula. Hatching results from the rations have been included in these studies, since the production of eggs of high hatchability is of great economic importance to both the flock owner and the hatcheryman. Similar studies with starting rations for chicks show that the simple rations are quite as satisfactory as a complex mixture. Since milk is quite advantageous in starting rations for chicks, the study of dried whey as a substitute for milk in these rations is under way. Cottonseed meal in the chick ration appears quite satisfactory as a substitute for a portion of the meat scraps. Further trials will be necessary to determine the best amounts of this feed to use. The effect of cottonseed meal upon the hatchability of eggs is still under study.

Better protection for the laying hens during the coldest and most windy weather is indicated in housing studies. The use of cloth curtains for the open front laying house for extreme weather appears profitable in the upper part of the state.

With the rise in egg prices coming early in the fall it is highly important to hatch pullets for earlier egg production. With the use of artificial lights in the laying house, studies in management indicate greater profits from the earlier hatched pullets than is possible where artificial lights are not used.

Many problems affecting poultry production await solution. Some progress is being made but as farm and commercial flocks increase the demand for experimental data along many phases, particularly disease and parasite control, will be required.

THE CLEMSON COLLEGE FARMS

The functions of the Farms Department are: to conduct its own experiments, grow crops on a larger scale as demonstrations, produce crops for the Agronomy Department for their experiments, and grow feeds for the experimental herds of dairy cattle, beef cattle, hogs, sheep, and poultry.

This year our plan of operation consists of: a continuation of soil improvement with manure versus a cover crop of vetch and rye in the production of cotton, a comparison of two varieties of Lespedeza for hay, a comparison of the yield and feeding value of corn and barley, a test of the comparative cost of production and feeding value of silage when produced from corn alone, a combination of corn and soybeans, and soybeans alone.

The acreages being grown to crops by the Farms Department this year are:

Corn -----	147
Corn and soybeans -----	36
Cotton -----	91
Oats and oats and vetch -----	100
Barley -----	10
Rye -----	10
Rye and vetch -----	71
Austrian winter peas -----	25
Soybeans -----	99
Lespedeza -----	29
Alfalfa -----	6
Johnson and Bermuda grass -----	30

The corn crop with the exception of about 15 acres is good, producing about eight acres of silage and 40 to 50 bushels of corn per acre. Twelve acres of this crop are in variety tests and the remaining acres are grown as a general crop to be used for the livestock here at the college.

Of the 36 acres grown in corn and soybeans eight acres producing nine tons per acre have been harvested for silage for the Dairy Department and the remaining 27 acres will have ears snapped and both the corn stalks and the soybeans will be turned back into the soil for improvement.

Of the cotton crop of 91 acres the Farms Department is conducting an experiment on three acres with fresh manure versus a cover crop of rye and vetch in the improvement of the soil where cotton is grown continuously. On 30 acres we have six promising varieties of cotton planted one variety to the terrace using four replications. The remainder of the area (58 acres) is in small plot experiments conducted by the Agronomy Department with variety tests and fertilizer experiments.

The 100 acres of oats and oats and vetch as well as the 10 acres each of rye and barley were practically a failure because of frequent rains during the harvest season.

The 96 acres of Austrian winter peas and rye and vetch made excellent growth which was turned back into the soil as has been the practice in our soil building program for the past 14 years.

Of the 29 acres of lespedeza 10 acres were grown as a soil-building crop and 19 acres were planted in two varieties for hay. Eight acres of Tennessee 76 lespedeza produced 17,000 pounds and 11 acres of Korean produced 33,210 pounds.

The alfalfa produced well but the frequent rains have been unfavorable for harvesting.

Ninety-one of the 99 acres in soybeans were grown as a general crop to be used for feed for livestock on experiments, etc. In view of the fact that we usually have unfavorable weather when harvesting hay, and also because of the danger of losing a crop from the overflow of Seneca river, we this year cut eight acres of soybeans for silage, which made a yield of four tons per acre. The Dairy Department will this year test the value of these soybeans and also corn and soybeans for silage. Should it develop that soybeans or soybeans and corn may be used for silage and can be harvested economically, our problem of dodging the river overflow and unfavorable weather during harvest time may be somewhat lessened.

The 30 acres that we have grown in Johnson grass and Bermuda grass for several years made good yields again this year.

THE COAST EXPERIMENT STATION AT SUMMERVILLE

Introduction

A large area of coastal South Carolina consists of the rather poorly drained soil types, Coxville and Portsmouth. The Coast Experiment Station lands are representative of these soil types which are not adapted to the growth of cotton, tobacco, and the majority of the truck crops, but are suitable for the production of feed and forage crops, pasture grasses, and timber. In view of these facts, the work of this station is concerned largely with the problems in the production of feed and forage crops, their utilization in beef and pork production, the development and fertilization of pastures, and the production and protection of timber on the marginal and submarginal lands. This report covers briefly the projects underway during the year 1934.

Effect of Fertilizer and Lime on the Growth and Composition of Carpet Grass

From previous observations, it was evident that carpet grass on the poorer cut-over coastal lands of South Carolina made very slow growth once a complete sod had become established. In view of this fact, a complete fertilizer test with a limed and unlimed series was initiated and has been under way since 1929. This work includes complete fertilizer applications, single and combinations of two of the fertilizer elements most commonly used, on both limed and unlimed series. Yields have been determined for the past three years and chemical analyses from

clippings of the various plots are being made by the Chemistry Department. To date, the data indicate that the largest increases in yields over the no-treatment plots have been secured from applications of a complete fertilizer with nitrogen following in the lead of single element applications, and nitrogen and phosphorus in the combinations of two elements.

A Study of the Effect of Superphosphate and Basic Slag on the Growth and Composition of Carpet Grass and Lespedeza

Preliminary chemical analysis of carpet grass from other fertilizer studies of pasture grass revealed a rather low iron and phosphorus content of carpet grass. To study the effect of basic slag and superphosphate on the growth and mineral content of carpet grass and lespedeza, a test consisting of 12 one-twentieth acre plots in duplicate receiving varying amounts of basic slag and superphosphate, was begun in the summer of 1932. Clippings from these plots are now being made, yields recorded, and samples of the clippings retained for chemical analysis. To date, yields and observations indicate considerable stimulation of the growth of carpet grass and lespedeza from the use of either basic slag or superphosphate alone. The most striking difference between the check plots and treated plots is the absence of lespedeza in the check plots and the excellent stands of lespedeza on the plots receiving the heavier applications of basic slag and superphosphate. The apparent inability of lespedeza to compete with carpet grass after the second year's growth of the sod has been one of the pasture problems of this section of the state. To date, lespedeza has satisfactorily reseeded and grown the fourth season where basic slag was applied at the rates of 500 to 1000 pounds per acre the second growing season after planting. It will be interesting to note whether or not this condition continues.

A Comparison of Methods of Preparing Cut-Over Coastal Lands for Seeding to Carpet Grass

Three methods of preparing cut-over coastal lands of the Coxville soil type have been compared for three successive years. These methods were as follows:

1—Burned in late winter.

2—Burned, disced with tractor tandem disc, and harrowed with smoothing harrow.

3. Burned, plowed, disced with tractor tandem disc, and harrowed with smoothing harrow.

Stand counts on each of the above plots were made in midsummer of each year. These counts show burning and discing to be 53.1 per cent as efficient as plowing, discing, and then harrowing, while the burning alone was only 4.8 per cent as efficient as the thorough method

of preparing the seed bed. While no further stand counts are contemplated, observations will be recorded as to the number of growing seasons that are required to secure a perfect sod on the unprepared plots.

Pasture Plant Adaptation Studies

Various pasture grasses have been grown in the garden for the past several years. The more promising of these grasses, other than carpet grass, have been used in pasture planting. To date, those that have proven satisfactory under grazing conditions are Dallis grass, centipede grass, and Bahia grass. Of the two similar grasses, Dallis and Bahia, Dallis grass has been more satisfactory from the standpoint of securing stands. It seems that it is very difficult to secure seed of high germination in the case of Bahia grass, hence very poor stands have been obtained. Centipede grass, being propagated from cuttings in this section, is rather easy to transplant, as is Bermuda. Pasture plantings of this grass have been made at two-, three-, and four-foot spacings, this work being done in 1930. From these plantings it is evident that on our unfertilized pastures a perfect sod can be expected from the different spacings mentioned above in two, three, and four years respectively.

Lespedeza Sericea

Lespedeza sericea or perennial lespedeza has been grown at this station for the past three years as a hay crop and for two seasons in pasture. In 1933, Strain 12087 produced 4,281 pounds of dry hay per acre and Strain 04730 produced 6,008 pounds of dry hay per acre, these yields being taken from 1932 18-inch row plantings. This season the first cutting yields from the same plots were 2,885 pounds of dry hay for Strain 12087 and 3,365 pounds of dry hay per acre for Strain 04730. Yields from 1933 broadcast seedings were slightly higher than from the 1932 row plantings. As a pasture plant, indications are that it is not particularly adapted to this use.

Corn Variety Test

The variety test of corn this season includes 14 of the leading white corns of the southeast and seven of the yellow varieties. Recognizing the superior feeding value of yellow corn for poultry and, under certain conditions, other classes of livestock, each year as many of the southern yellow varieties as are available are included in this work, with the hope of finding a satisfactory yellow corn that will consistently approximate the yields of the better white varieties. The leading varieties of the 1933 test were Wood's Dixie with a yield of 66.96 bushels of shelled corn per acre; Latham's double, 65.5 bushels; Wood's golden prolific, 59.16 bushels; and Marrett's yellow chief, 58.26 bushels.

Forestry Studies

No new plantings have been made in forestry areas of the station lands, and the work previously begun has been continued and entirely protected from fire and marauding scrub livestock. Fire lines surround-

ing the forestry plantings and entirely around the station tract have been developed to the extent that it has been possible and practicable to prepare them for the past two seasons in an effective and economical manner by the use of a tractor tandem disc. This method of preparing fire lines has a distinct advantage over the burning method in that lines may be prepared in early fall before the usual forest fires begin to occur. By the use of these fire lines, we have been able to protect the entire station tract from fires since 1927, while all lands adjacent have burned annually. Under this system of protection, areas not being used in forestry experimental work or for pasture have become densely stocked with loblolly and longleaf seedlings that are making rapid growth.

A Study of the Effect of Calcium and Phosphorus on the Growth and Breeding Qualities of Beef Cattle

The study of the effect of calcium and phosphorus on the growth and breeding qualities of beef cattle is a cooperative project with the Bureau of Animal Industry, U. S. Department of Agriculture. This work was initiated in the winter of 1930 and planned to continue for a period of five or more years since any differences in rate of growth that might occur would become evident in second and third generations. This project required as foundation stock 20 heifers, which were supplied from the station herd of purebred Aberdeen Angus. The feeds and pasturage for the check and mineral-fed lots are identical with the exception of the calcium and phosphorus mixture which is being fed to the mineral lot. Service records, individual weights of cows at given intervals, calves' weight at birth and subsequently at regular intervals have revealed only slight differences in the two lots. However, no conclusions can as yet be drawn, since data from future generations may reveal differences not now evident.

A Comparison of Winter Forage Crops for Fattening Hogs

During the past two winters, rye, rape, oats, and barley have been compared as forage crops for fattening hogs when fed corn and fishmeal free-choice. In connection with this test, fishmeal alone and a mixture of one-half fishmeal and one-half cottonseed meal have been compared as protein supplements to corn when hogs are grazed on rye. Purebred Poland China pigs from the station herd have been used exclusively in this work. Results from this test show a slight saving in corn consumption per 100 pounds of pork produced by the use of green forage crops, there being only slight differences in rye, oats, and barley while rape shows the lowest amount of corn saved. The saving in protein supplement was approximately 33 per cent over dry-lot feeding in the case of all forage crops. In addition to the feed saving, especially protein supplement, all green forages were entirely effective in the prevention of rickets even though the pigs were raised in dry lot until the beginning of the test and fed on white corn exclusively. In the case of the dry or

check lot 25 per cent of the pigs were affected with rickets and failed to complete the test. In the comparison of the mixture of fishmeal and cottonseed meal and fishmeal alone as protein supplements, there was no saving in the cost of 100 pounds gain by the use of cottonseed meal in the mixture. This mixture seemed to be more palatable than fishmeal alone, consequently the pigs consumed a proportionately greater amount which offset the lower cost figure.

THE PEE DEE EXPERIMENT STATION AT FLORENCE

The Pee Dee station located near the center of the Pee Dee section of the state is used almost entirely for conducting investigations and making experiments with the field crops grown in that section of the state.

Much of the work is cooperative with the Bureau of Plant Industry and the Bureau of Entomology of the U. S. Department of Agriculture.

The fundamental research projects are naturally concerned with tobacco and cotton and with the grain and hay crops that are important in this section. Space does not permit even a summary of the results with all of the experiments but a list of those under way follows:

Cotton

Cotton variety test—40 varieties
Cotton variety test—24 varieties—sweet poison only
Fertilizer placement studies—27 tests
Seed treatment—delinting and dustings
Time of applying fertilizer
Rate of applying stable manure—1-2-3-4-tons per acre in drill
Source of phosphorus—4 sources
Brands of nitrate of soda as sole source of ammonia
Source of ammonia as side-dresser—12 sources
Varying amounts of lime
Sole source of ammonia—13 sources
Varying amounts of nitrogen as side-dresser
Varying amounts of potash as side-dresser
Keitt plat fertilizer and rotation studies
Time of planting
Cotton following winter legume cover crops
Varying width rows for cotton
Varying amounts of calcium arsenate
Methods of preparing cotton beds
Time of picking

Corn

Variety test of leading varieties
Varying width rows—4-5 and 6 feet
Effect of beans in drill with corn on yield
Effect of winter legume cover crops on corn yield
Fertilizer and rotation studies
Corn breeding with Pee Dee No. 5

Peanuts

Time of planting
 Methods of stacking
 Time of harvesting
 Varieties and strain tests

Potatoes

Various fertilizers
 Variety trials
 Effect of first, second, and third pull draw on yield
 Time of setting

Tobacco

Seed bed preparation
 Blue mold control
 Nutritional studies
 Effect of rotation and weeds on quality and yield
 Variety tests

Miscellaneous

Lespedeza
 Castor beans
 Artichokes
 Crotalaria
 Sesbania
 Pyrethrum
 Soybeans
 Flax

Cooperative Projects

For a number of years we have cooperated with the Bureau of Entomology, U. S. Department of Agriculture, in boll weevil control investigations. Mr. F. F. Bondy, with several assistants, is in charge of this phase of work, which at present consists of hibernation studies and control method. A total of 33,000 weevils was used in hibernation studies the past winter.

Control methods are tested on a large number of farms in the county. Various dust combinations are being tried out this year as follows:

Paris green
 1/2 calcium arsenate, 1/2 lime
 1/3 calcium arsenate, 2/3 lime
 2/3 calcium arsenate, 1/3 lime
 Calcium arsenate alone
 Sweet poison (1-1-1 mixture)

The object in mixing calcium arsenate and lime in varying proportions is to reduce the amount of calcium arsenate applied at each dusting, thereby lessening the danger of creating a toxic condition in the light sandy soils, making it impossible to grow certain leguminous crops.

Life history studies of the cotton root louse are being made by Mr. C. F. Rainwater, assistant entomologist. This insect often causes serious injury to young cotton seedlings, frequently destroying a stand of cotton. Very little is known regarding control measures, and we are hopeful that his life history studies will enable us to find some effective control practices.

Mr. J. E. Webb, assistant in entomology, is making studies of the life history and control measures of the corn billbug, which does serious injury to young corn in this section of the state. He is also working on the corn weevil and methods of treating and storing corn to lessen the enormous damage to stored corn by this insect.

We are also cooperating with the Bureau of Plant Industry, U. S. Department of Agriculture, in tobacco, peanut and potato investigations. Mr. W. M. Lunn is in charge of the tobacco investigations, which consist of nutritional studies, disease control, rotations, seed bed preparation, and variety trials. Approximately 80 different fertilizer combinations are being used in the nutritional studies. Different methods of plant bed construction and heating are being tested in connection with blue mold control in tobacco beds.

Plant physiology studies by Dr. Albert have been confined principally to cotton this year. He is growing cotton plants in nutrient solutions of high and low magnesium content. The purpose of these studies is to observe the effects of varying amounts of magnesium upon cotton plant behavior, particularly fruiting and fruit shedding.

He is also continuing to study the effects of certain soluble salts, such as are commonly used in fertilizers, upon the solubility of arsenic when added to the soil.

THE SANDHILL EXPERIMENT STATION IN RICHLAND COUNTY

Satisfactory progress, on the whole, has been made in experimental work now under way at the Sandhill Station, and additional data are being assembled which will throw light on the problems of management of sandy soils such as is to be dealt with here.

The plant is in fair condition though several of the buildings are beginning to show the need of repairs.

The assembly hall near the lake has been completed and is being used, as planned, for meetings of farmer folks. These meetings are usually held in conjunction with trips of inspection over the experimental plots of the station, from which many farmers express themselves as being greatly benefited.

Agronomy

The agronomic work at this station consists chiefly of fertilizer experiments and variety trials with field crops. The coarse sandy soil, which is low in available plant food, affords an excellent opportunity for studying the effects of various fertilizer materials on the growth of num-

erous crops. It has been found that by following a carefully planned cropping system and supplying the proper amounts of plant food profitable returns may be gotten from the soil.

Since nitrogen, phosphorus and potassium are commonly considered the three essential plant food elements, a separate test is conducted annually for each of these elements using all of the common sources that are on the market.

For the past few years there has been considerable interest in the relative value of the different brands of sodium nitrate. In 1931 a test was started at this station using the old process Chilean, Champion, and Arcadian brands. This test has continued for three years and there have not been any significant differences in the yields of seed cotton from the different sources.

Comprehensive tests with potash are being conducted to determine the most economical rate, time of applying, residual effect, and source of potash for cotton production. It has been found that cotton on these soils requires about 50 or 60 pounds of water-soluble potash for an economical production of cotton, but that there does not seem to be much relation between the time of application of potash and the yield of seed cotton. Sulfate of potash and magnesium sulfate have given highest yields in the source test.

Variety tests are conducted each year with cotton, corn, oats, barley, and wheat to determine those varieties best adapted for this region of the state.

In 1933 26 varieties and strains of cotton were included in the test. Rhyne's Cook, Marett's Cleveland Big Boll New 5-5, and Dixie Triumph were the leading varieties with a yield of 744, 674, and 665 pounds of seed cotton per acre respectively. The average yield for all varieties was 576.3 pounds of seed cotton per acre.

Seventeen white varieties and nine yellow varieties of corn were included in the corn variety test in 1933. Coker's Garrick St. 10, Hastings' Prolific, and Douthit's Prolific were the three leading white varieties, with yields of 26.4, 25.1, and 24.3 bushels per acre respectively. The average for all white varieties was 20.8 bushels per acre. Good's Golden Prolific, Jarvis Golden Prolific, and Hastings' Golden were the three leading yellow varieties, with yields of 22.7, 20.1, and 17.5 bushels per acre respectively. The average yield of all yellow varieties was 16.9 bushels per acre.

In 1933 a magnesium and potash deficiency test was started, using 11 of the major field crops and nine horticultural crops as indicators of these deficiencies. The plots were cross-treated with dolomitic limestone and basic slag at the rate of one ton per acre. A careful observation of each crop has been made but at present there are no conclusive data for publication.

Forage Crops

Forage crops consist principally of plant types, seed selection, winter and summer legumes, hay crops, pasture grasses, and green manuring. The work as a whole is a continuation of experiments that have been carried for two or three years, the outline and details of which have been fully described in previous reports.

A total area of 40 to 45 acres containing approximately 1200 plots has been utilized for this study each year. The soil, being level to slightly rolling and depleted in almost every element of plant food, is ideal for various treatments.

Crotalaria has attracted a great deal of attention because of its persistence over a period of dry weather. Some 30 to 40 varieties, and selections are in test but Carolina *Crotalaria* (*Crotalaria spectabilis* 18096, an early selection made at the station in 1929 from *Crotalaria spectabilis* 64062) is the most outstanding because of its early maturity and abundant seed crop. Over a period of three years it has an average seed yield of 550 pounds per acre. *Crotalaria striata* 76354, a new selection planted first in 1933, is about 15 days later in maturity than the original *Crotalaria striata* 19322, but its mammoth growth and woody nature place it as the leading selection of *Crotalaria striata* for soil building. Increase plantings have been made of these selections for seed production.

Some 20 or more varieties and one to two hundred selections of soybeans are in trial plantings each year. The Matthews variety gave the highest hay and seed yield in 1933. A number of the vegetable-type soybeans have also been added to the list for special study. Since they have a high protein content they can be used in the human diet somewhat as a substitute for meats.

Ten varieties of cowpeas are in trial plantings, Brabham giving the highest hay yield, Whippoorwill leading in seed production.

The growth in the summer green manure crops and corn yields were very satisfactory.

Pasture grasses made splendid growth and supplied far more grazing than during the previous year.

Oats and winter legumes suffered severe cold injury during the over-night freeze in February.

Special attention is being given to winter and summer legumes, pasture grasses, and green manure crops.

Soil Fertility

The work of the Soil Fertility Division has as its ultimate aim the study of the influence of fertilizers and of various crops upon the organic matter content of the soil. Although such a study must be centered around the plant-food, nitrogen, the effects of other materials in relation to the production of normal plant growth must also be taken into account. It is of importance to learn the effects of each, singly and

in combination, upon the composition of the plant. Apparently the management of soil-building crops determines to some extent the trend of the conservation of the organic matter of the soil of which any particular crop is to become a part. With these points in mind the following projects are in progress.

1. Twenty-one fertilizers carrying the three common plant-food elements singly or in combination and totaling 15 per cent have been used for the production of soybeans over a period of six years. The influence of the various fertilizers upon the mineral content of soybean hay has been studied and the data are being reviewed in detail, as well as those for the all content of the seed. A comparison has been made of the degrees of conservation of soil organic matter as affected by the turning of threshed hay, the succulent material as a green manure, and the stubble only. The periodic sampling of the soil for the pH determination has given an indication of the effect of a continued one-crop, one-fertilizer system upon the acidity of the soil used.

2. The relative efficiencies of mineral and organic nitrogen when used in a rotation of legumes, corn, and cotton, are being studied. Summer legumes are grown with a 2-8-4 and a 6-8-4 fertilizer. In the former case the full crop is turned as a green manure and in the latter only the stubble is turned. Corn is then grown with a 2-8-4 and a 6-8-4 fertilizer on the respective plots, followed by cotton. This year completes the second round of the rotation.

It is of interest to note at this point the plant-food deficiency symptoms obtained in these two experiments, to be correlated with the organized studies of Dr. Cooper and Mr. Wallace.

One-third of the nitrogen of the above fertilizers comes from cottonseed meal. The magnesium furnished by the meal used in 400 pounds of 6-8-4 fertilizer for corn or legumes, or 800 pounds for cotton, is hardly sufficient to meet the needs of the crops if leaching rains fall; this is influenced also by the sources of the remainder of the nitrogen used.

3. A further study of the effects of fertilizer and management of crops upon the organic matter of the soil, both potential and available, is being made using lysimeters. This study is now in its second year, and though the time elapsed is very short for this type of study, very large differences have been obtained in the losses of nitrogen as influenced by the cropping systems and methods of management of the summer crops used.

The following are projects in cooperation with other units of the organization.

1. The analytical data obtained by the analysis of representative samples of shrubs and weeds furnished by the Office of Forage Crops in their eradication studies are on file in the offices of the various cooperating agencies. No attempt to study them in detail will be made until the agronomic phase of the project is completed.

2. The field studies of the green-maturing plots started in 1928 by the Office of Forage Crops are being continued. The analytical data for the soil samples of these plots have been forwarded to the offices concerned.

3. Forage samples for the year 1933 furnished by the Bureau of Dairy Industry have been analyzed. The samples taken this season will be analyzed when time permits.

Horticulture

Horticultural experimentation during the past year has been largely a continuation of projects described in previous reports. The plantings of peaches and other tree fruits, grapes, and asparagus, upon which many of the horticultural projects are based, have developed sufficiently to give preliminary data of yields and other responses.

Three crops of peaches harvested from experimental plots have given information concerning fertilization and culture of young trees. Recently introduced varieties have fruited and are attracting the attention of sandhill orchardists.

Yield and growth records from some 30 varieties of grapes are demonstrating those types better adapted to local conditions, and behavior of those varieties upon hardy, vigorous root stocks is being studied.

Six acres of asparagus, divided into 250 plots, are yielding data on fertilization, food reserves of the crown, and harvesting practices, and are furnishing material for a study of individual plant performance as a basis for varietal selection and breeding.

In addition to the principal projects outlined, other studies with various crops such as sweet potatoes, melons, and berries are being conducted in order to present as complete attack as possible on the horticultural problems and possibilities of the sandhills.

Dairy

Investigational work at this station is being continued along the lines previously reported. One of the most interesting studies in this field is that with annual pastures. We have found that by properly planning the planting of small grain mixtures of pearl millet and soybeans we can keep the dairy cows on pasture practically every day in the year and have them secure more than three-fourths of the total required digestible nutrients from these pastures.

With the whole country looking to a larger use of roughages and pastures, dairy cattle maintenance and feeding experiments along this line assume added importance.

The breeding and advance registry work with the herd has gone forward according to plans and splendid production records have been made by several cows. Five young bulls from this herd are loaned to farmers and dairymen in the proven-sire project.

THE TRUCK EXPERIMENT STATION IN CHARLESTON COUNTY

Our research work for this period was outlined under four principal divisions, namely, plant pathology, entomology, plant physiology, and horticulture.

Plant Pathology

Experiments were continued on bean seed treatment for the control of root rot, on the relation of fertilizers to root rot on beans, on the method of fertilizer application and its relation to root rot on beans, on the relation of time of planting to the development of root rot on beans, on the comparative varietal resistance of beans to root rot, mosaic, anthracnose, and bacterial blight, and on the use of various dusts and sprays as control measures for powdery mildew on beans.

While several phases of this work are as yet incomplete, we have indications that bean seed treatment is useless as a control for root rot except on early spring plantings and in these cases only with one or two experimental chemicals. Our fertilizer work indicates a decided influence of some constituents on stand of beans and on root rot. There is a direct relation between the time of planting beans and the development of root rot, that is, the later the planting in spring the less root rot will develop. In the control of powdery mildew on beans, we have a definite control worked out. This information will be ready for publication during the next few months.

We have, during the past three years, worked out a correlation between the rainfall of this section and the development of early blight on potatoes. As a result of this we have been able to establish a spray and dust information service for our coastal potato growers which should reduce their operation costs materially in the future. Through this service, the farmers are advised when it is necessary to spray or dust, if such necessity arises. During the spring of 1934 we were able to save the entire spray and dust bill for our growers, a bill which amounts to more than \$50,000 per season for Charleston county alone.

Plant Physiology

Through the assistance of Dr. H. P. Cooper, work was started at this station in 1933 on a study of the influence of various rare elements on plant growth. During 1934 cabbage and potato field experiments were started to determine the effect on these crops of certain fertilizer combinations containing magnesium and manganese. The cabbage experiments were lost through the freeze of February but the potato tests were carried to completion. Here we found a decided influence of manganese on yield, amounting in some cases to more than 20 per cent. This reaction was so definite that we are planning to release the information to our growers in order that they may benefit by it on their 1935 crop.

Horticulture

The horticultural work at this station is confined almost entirely to vegetable crops and includes fertilizer experiments with the more important crops, variety tests, breeding work with cabbage and beans, and various tests of cultural practices. A small citrus orchard has been start-

ed, and a number of strawberry varieties are being grown, but no further work with fruits is contemplated for the time being. A brief summary of projects follows:

Cabbage and Bean Breeding.—Breeding work with cabbage and beans was inaugurated in 1933, the purpose of which is to improve, by hybridization and selection, some of the varieties which are commonly grown here but which are not entirely satisfactory on account of certain undesirable characteristics. The breeding program with cabbage will center mostly on the development of a strain of Charleston Wakefield which will head uniformly and be practically free of off-type plants. Some of the hybrid beans which were obtained from crosses made in 1933 have already been carried through three generations and several promising individuals have been isolated. The project is to be continued over a period of years.

Fertilizer Experiments.—Sixteen different fertilizer combinations and four rates of application of a standard formula are included in fertilizer experiments which are being carried on with beans, cabbage, potatoes, sweet potatoes, and tomatoes. One year's results with beans and tomatoes indicate that less nitrogen and potash may be used profitably on these crops. These experiments will have to be carried further before any definite recommendations can be made.

Variety Tests.—Variety tests were made of most of the important truck crops during the past year and a complete record was kept of the performance of each variety. The increased interest in plant breeding has resulted in the development of many new varieties and strains, and these are being tried as rapidly as seed becomes available. Different strains of any one variety vary considerably, and results of the past year's work show that it will pay the average truck grower to use the best strains, even though the seed may cost slightly more, on account of the increased yields and better quality of the resulting crop.

Spacing Tests.—Preliminary tests show that highest yields of Charleston Wakefield cabbage may be expected where plants are spaced 12 inches apart in the row. Wider spacings resulted in larger individual heads but a smaller total yield. In tests with potatoes plants were spaced 12 inches apart in rows 33, 36, and 42 inches apart respectively. Highest yields were obtained where the rows were spaced 36 inches apart. Work with bush beans indicates that closer spacing of plants in the row may be profitable, even though it necessitates the use of more seed.

Citrus Fruits and Strawberries.—Hardy varieties of satsumas and satsuma stocks, supplied by the United States Department of Agriculture were planted in the field November 1, 1933. The grafted plants were all banked with soil to a point about 12 inches above the graft. During the

winter the lowest temperature recorded at this station was 13 degrees F. January 31. All of the satsuma varieties were killed to the ground, but when the banked soil was removed in the spring most of the plants put out new growth above the point where they had been grafted. Ichang, Rusk, and Cunningham citrange seedlings, intended for use as stocks, apparently were not injured by the cold weather.

Twelve of the leading strawberry varieties were planted in test plots and will be compared on the basis of yields and quality. During the past season Bellmar and Blakemore, two of the newer varieties, proved very promising and seem to be well adapted to our conditions.

Entomology

The U. S. Bureau of Entomology continued its research studies on truck crop insects at the station throughout the fiscal year 1934. Work during the period was chiefly a continuation of those projects that were underway during the previous year. A summary of the accomplishments, listed according to the various projects, follows.

Cabbage Insect Control and Harmful Insecticide Residue Studies.—The purpose of this project is to develop a means of combating cabbage insects efficiently without the danger of resulting harmful residues. It was begun as a consequence of the increasing agitation and the laws establishing tolerances for the residues of such insecticides as are known to be harmful to man. The studies on this project are along two lines of endeavor. We are attempting to determine if the substances known to be harmful to man can be safely and effectively used on such crops as cabbage; and if so, how.

Quite encouraging results have been obtained. It was found that certain of the arsenicals could be used with apparent safety on cabbage during the early period of the growth of the plant. Several materials, not considered to be toxic to humans, have shown great promise as substitutes for the harmful insecticides.

Control of the Melon Worm and the Pickle Worm on Cucurbits.—The melon worm and the pickle worm quite often entirely prevent the production of cucurbits, (squash, cucumbers, and melons) during the late summer and fall months in the South Atlantic States. Control studies on this important project were continued during the fiscal year 1934. The indications are that an efficient method of combating the insects on squash, which does not involve the use of dangerous insecticides, has been developed.

The Value of Nicotine Products as Truck Crop Insecticides.—With the aid of funds allotted for the purpose by the Agricultural Adjustment Administration a special project was conducted by the U. S. Bureau of Entomology during the period from November, 1933, through May, 1934. The purpose of this project was to test certain nicotine products as insecticides on vegetable crops. If it were found that the nicotine products are effective against such insects, an increased demand for the cheaper grades of tobacco might result.

Although hampered during the winter months by lack of insects on which to use the insecticides, some quite promising results were obtained, and further studies seem desirable and warranted.

Extension Activities.—Even though the work of the U. S. Bureau of Entomology here is essentially research in nature, personal assistance with their insect problems was given where possible to growers of the South Carolina coastal area.

PUBLICATIONS

The publications of the station are in increasing demand, particularly in connection with economics, farm management, marketing, soil building, and livestock. This indicates that there is among farmers a higher appreciation of the value of scientific research and a greater tendency to study the business of farming. The publications on hand at the beginning of the year and those issued during the year have been used up so rapidly that it would seem desirable to print publications in larger quantities hereafter.

Distribution of the publications of the station is through a classified mailing list which receives constant revision and which now contains over six thousand names classified according to important subject matter divisions covered in research work.

Bulletins, Circulars, and Reports

During the fiscal year 10 new publications were issued, including, six bulletins, three circulars, and one annual report.

Technical Contributions

During the year six technical contributions to scientific publications have been published by members of the station staff. Other technical contributions have been assigned numbers but publication in technical journals has not yet been reported.

Publicity Work

Publicity work included during the year 65 news letters, 11 of which were reports on new publications or references to previous publications. These news letters and a number of special articles have been distributed through the Publications Department for the use of the newspapers of South Carolina and agricultural journals. In this way attention is called to the various activities of the station and the publications which are issued from time to time reporting the results of research work. The tendency among some members of the station staff to prepare material for news letters and special articles is encouraging, and it is hoped that all the members of the staff will make greater effort to prepare material in the nature of progress reports on various phases of projects under way. In this way the public will be given wider and better knowledge of the work which the station does, and this in turn will enable the station to be of greater service to the public.